MITSUBISHI ELECTRIC

MOTION CONTROLLERS

Changes for the Better

MOTION CONTROLLER

Q111BD-SSC

Q110BD-SSC

User's Manual

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using this equipment, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly.
These precautions apply only to this equipment. Refer to the Users manual of the QCPU module to use for a description of the PLC system safety precautions.
These SAFETY PRECAUTIONS classify the safety precautions into two categories: "DANGER" and "CAUTION".

! DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results.
In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

For Safe Operations

1. Prevention of electric shocks

⚠ DANGER

- Never open the front case or terminal block covers of the servo amplifier while the power is ON or the unit is running, as this may lead to electric shocks.
- Never run the servo amplifier with the front case or terminal cover removed. The high voltage terminal and charged sections will be exposed and may lead to electric shocks.
- Never open the front case or terminal cover of the servo amplifier at times other than wiring work or periodic inspections even if the power is OFF. The insides of the servo amplifier are charged and may lead to electric shocks.
- When performing wiring work or inspections, turn the power OFF, wait at least ten minutes, and then check the voltage with a tester, etc.. Failing to do so may lead to electric shocks.
- Be sure to ground the controller incorporating the Motion board, servo amplifier and servomotor. (Ground resistance : 100 Ω or less) Do not ground commonly with other devices.
- The wiring work and inspections must be done by a qualified technician.
- Wire the units after installing the Motion board, servo amplifier and servomotor. Failing to do so may lead to electric shocks or damage.
- Never operate the switches with wet hands, as this may lead to electric shocks.
- Do not damage, apply excessive stress, place heavy things on or sandwich the cables, as this may lead to electric shocks.
- Do not touch the Motion board, servo amplifier or servomotor terminal blocks while the power is ON, as this may lead to electric shocks.
- Do not touch the built-in power supply, built-in grounding or signal wires of the Motion board and servo amplifier, as this may lead to electric shocks.
- For handling a personal computer, follow the instruction manual for the personal computer to be used. Mistaken handling of a personal computer may lead to electric shocks or damage.

2. For fire prevention

⚠ CAUTION

- Install the Motion board, servo amplifier, servomotor and regenerative resistor on Nonflammable material. Direct installation on flammable material or near flammable material may lead to fire.
- If a fault occurs in the Motion board or servo amplifier, shut the power OFF at the servo amplifier's power source. If a large current continues to flow, fire may occur.
- When using a regenerative resistor, shut the power OFF with an error signal. The regenerative resistor may abnormally overheat due to a fault in the regenerative transistor, etc., and may lead to fire.
- Always take heat measures such as flame proofing for the inside of the control panel where the servo amplifier or regenerative resistor is installed and for the wires used. Failing to do so may lead to fire.

3. For injury prevention

⚠ CAUTION
● Do not apply a voltage other than that specified in the instruction manual on any terminal. Doing so may lead to destruction or damage.
● Do not mistake the terminal connections, as this may lead to destruction or damage.
● Do not mistake the polarity (+ / -), as this may lead to destruction or damage.
● Do not touch the servo amplifier's heat radiating fins, regenerative resistor and servomotor, etc., while the power is ON and for a short time after the power is turned OFF. During this time, these parts become very hot and may lead to burns.
● Always turn the power OFF before touching the servomotor shaft or coupled machines, as these parts may lead to injuries.
● Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.
● Do not touch the insides of the printed-circuit board or electronic parts of the Motion board. Lead wires, etc. are exposed and may lead to injuries.

4. Various precautions

Strictly observe the following precautions.

Mistaken handling of the unit may lead to faults, injuries or electric shocks.

(1) System structure

⚠ CAUTION
● Always install a leakage breaker on a controller incorporating the Motion board and servo amplifier power source.
● If installation of an electromagnetic contactor for power shut off during an error, etc., is specified in the instruction manual for the servo amplifier, etc., always install the electromagnetic contactor.
● Install the emergency stop circuit externally so that the operation can be stopped immediately and the power shut off.
● Use the Motion board, servo amplifier, servomotor and regenerative resistor with the combinations listed in the instruction manual. Other combinations may lead to fire or faults.
● If safety standards (ex., robot safety rules, etc.,) apply to the system using the Motion board, servo amplifier and servomotor, make sure that the safety standards are satisfied.
● Construct a safety circuit externally of the Motion board or servo amplifier if the abnormal operation of the Motion board or servo amplifier differ from the safety directive operation in the system.
● In systems where coasting of the servomotor will be a problem during the forced stop, emergency stop, servo OFF or power supply OFF, use dynamic brakes.

⚠ CAUTION

- Make sure that the system considers the coasting amount even when using dynamic brakes.
- In systems where perpendicular shaft dropping may be a problem during the forced stop, emergency stop, servo OFF or power supply OFF, use both dynamic brakes and electromagnetic brakes.
- The dynamic brakes must be used only on errors that cause the forced stop, emergency stop, or servo OFF. These brakes must not be used for normal braking.
- The brakes (electromagnetic brakes) assembled into the servomotor are for holding applications, and must not be used for normal braking.
- Install an external safety circuit to ensure the security of the entire system even during a fault of the personal computer.
- Configure the system with the system reliability ensured by fully understanding the performance and functions (such as data saving at a power failure) of the personal computer.
- The system must have a mechanical allowance so that the machine itself can stop even if the stroke limits switch is passed through at the max. speed.
- Use wires and cables that have a wire diameter, heat resistance and bending resistance compatible with the system.
- Use wires and cables within the length of the range described in the instruction manual.
- The ratings and characteristics of the parts (other than Motion board, servo amplifier and servomotor) used in a system must be compatible with the Motion board, servo amplifier and servomotor.
- Install a cover on the shaft so that the rotary parts of the servomotor are not touched during operation.
- There may be some cases where holding by the electromagnetic brakes is not possible due to the life or mechanical structure (when the ball screw and servomotor are connected with a timing belt, etc.). Install a stopping device to ensure safety on the machine side.

(2) Parameter settings and programming

⚠ CAUTION

- Set the parameter values to those that are compatible with the Motion board, servo amplifier, servomotor and regenerative resistor model and the system application. The protective functions may not function if the settings are incorrect.
- The regenerative resistor model and capacity parameters must be set to values that conform to the operation mode, servo amplifier and servo power supply module. The protective functions may not function if the settings are incorrect.
- Set the mechanical brake output and dynamic brake output validity parameters to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.

⚠ CAUTION

- Set the stroke limit input validity parameter to a value that is compatible with the system application. The protective functions may not function if the setting is incorrect.
- Set the servomotor encoder type (increment, absolute position type, etc.) parameter to a value that is compatible with the system application. The protective functions may not function if the setting is incorrect.
- Set the servomotor capacity and type (standard, low-inertia, flat, etc.) parameter to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Set the servo amplifier capacity and type parameters to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Use the program commands for the program with the conditions specified in the instruction manual.
- Some devices used in the program have fixed applications, so use these with the conditions specified in the instruction manual.

(3) Transportation and installation

⚠ CAUTION

- Transport the product with the correct method according to the mass.
- Use the servomotor suspension bolts only for the transportation of the servomotor. Do not transport the servomotor with machine installed on it.
- Do not stack products past the limit.
- When transporting, installing or removing the Motion board, never touch the insides of the printed-circuit board or electronic parts of the Motion controller. Instead, hold the front panel or edges of the printed-circuit board.
- When transporting servo amplifier, never hold the connected wires or cables.
- When transporting the servomotor, never hold the cables, shaft or detector.
- When transporting the servo amplifier, never hold the front case as it may fall off.
- When transporting, installing or removing the servo amplifier, never hold the edges.
- Install the unit according to the instruction manual in a place where the mass can be withstood.
- Do not get on or place heavy objects on the product.
- Always observe the installation direction.
- For installation of the Motion board, use connecters and slots that conform with the specifications. Keep the designated clearance between the Motion board and other boards.
- Keep the designated clearance between the servo amplifier and control panel inner surface, and the servo amplifier, and other devices.

⚠ CAUTION

- Do not install or operate the Motion board, servo amplifiers or servomotors that are damaged or that have missing parts.
- Do not block the intake/outtake ports of the servomotor with cooling fan.
- Do not allow conductive matter such as screw or cutting chips or combustible matter such as oil to enter the Motion board, servo amplifier or servomotor.
- The Motion board servo amplifier and servomotor are precision machines, so do not drop or apply strong impacts on them.
- Securely fix the Motion board and servo amplifier to the machine according to the instruction manual. If the fixing is insufficient, these may come off during operation.
- Always install the servomotor with reduction gears in the designated direction. Failing to do so may lead to oil leaks.
- Store and use the unit in the following environmental conditions.

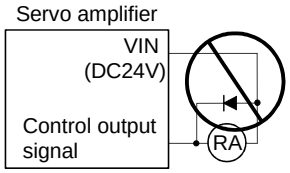
Environment	Conditions	
	Motion board/Servo amplifier	Servomotor
Ambient temperature	According to each instruction manual.	0°C to +40°C (With no freezing) (32°F to +104°F)
Ambient humidity	According to each instruction manual.	80% RH or less (With no dew condensation)
Storage temperature	According to each instruction manual.	-20°C to +65°C (-4°F to +149°F)
Atmosphere	Indoors (where not subject to direct sunlight). No corrosive gases, flammable gases, oil mist or dust must exist	
Altitude	1000m (3280.84ft.) or less above sea level	
Vibration	According to each instruction manual	

- When coupling with the servomotor shaft end, do not apply impact such as by hitting with a hammer. Doing so may lead to detector damage.
- Do not apply a load larger than the tolerable load onto the servomotor shaft. Doing so may lead to shaft breakage.
- When not using the Motion board for a long time, disconnect the Motion board from the personal computer. Also disconnect the power line from the servo amplifier
- Place the Motion controller and servo amplifier in static electricity preventing vinyl bags and store.
- When storing for a long time, please contact with our sales representative.

(4) Wiring

⚠ CAUTION

- Correctly and securely wire the wires. Reconfirm the connections for mistakes and the terminal screws for tightness after wiring. Failing to do so may lead to run away of the servomotor.
- After wiring, install the protective covers such as the terminal covers to the original positions.
- Do not install a phase advancing capacitor, surge absorber or radio noise filter (option FR-BIF) on the output side of the servo amplifier.
- Correctly connect the output side (terminals U, V, W). Incorrect connections will lead the servomotor to operate abnormally.
- Do not connect a commercial power supply to the servomotor, as this may lead to trouble.
- Do not mistake the direction of the surge absorbing diode installed on the DC relay for the control signal output of brake signals, etc. Incorrect installation may lead to signals not being output when trouble occurs or the protective functions not functioning.



- Do not connect or disconnect the connection cables between each unit, and the encoder cable while the power is ON.
- Securely tighten the cable connector fixing screws and fixing mechanisms. Insufficient fixing may lead to the cables coming off during operation.
- Do not bundle the power line or cables.

(5) Trial operation and adjustment

⚠ CAUTION

- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
- Extreme adjustments and changes may lead to unstable operation, so never make them.
- When using the absolute position system function, when starting up for the first time and when the Motion board or absolute value motor has been replaced, always perform a home position return.

(6) Usage methods

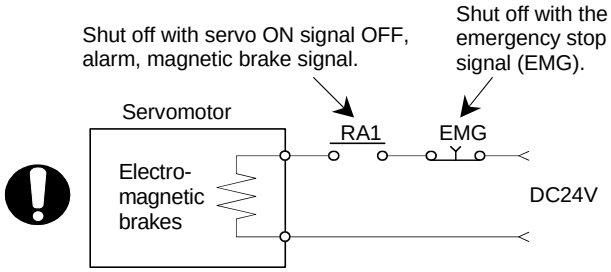
⚠ CAUTION

- Immediately turn OFF the power if smoke, abnormal sounds or odors are emitted from the Motion board, servo amplifier or servomotor.
- Always execute a test operation before starting actual operations after the program or parameters have been changed or after maintenance and inspection.
- The units must be disassembled and repaired by a qualified technician.
- Do not make any modifications to the unit.
- Keep the effect or electromagnetic obstacles to a minimum by installing a noise filter or by using wire shields, etc. Electromagnetic obstacles may affect the electronic devices used near the Motion board or servo amplifier.

(7) Corrective actions for errors

⚠ CAUTION

- If an error occurs in the self diagnosis of the Motion board or servo amplifier, confirm the check details according to the instruction manual, and restore the operation.
- If a dangerous state is predicted in case of a power failure or product failure, use a servomotor with electromagnetic brakes or install a brake mechanism externally.
- Use a double circuit construction so that the electromagnetic brake operation circuit can be operated by emergency stop signals set externally.



- If an error occurs, remove the cause, secure the safety and then resume operation after alarm release.
- The unit may suddenly resume operation after a power failure is restored, so do not go near the machine. (Design the machine so that personal safety can be ensured even if the machine restarts suddenly.)

(8) Maintenance, inspection and part replacement

⚠ CAUTION

- Perform the daily and periodic inspections according to the instruction manual.
- Perform maintenance and inspection after backing up the program and parameters for the Motion board and servo amplifier.
- Do not place fingers or hands in the clearance when opening or closing any opening.
- Periodically replace consumable parts such as batteries according to the instruction manual.
- Do not touch the lead sections such as ICs or the connector contacts.
- Do not place the Motion board or servo amplifier on metal that may cause a power leakage or wood, plastic or vinyl that may cause static electricity buildup.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- When replacing the Motion board or servo amplifier, always set the new module settings correctly.
- When the Motion board or absolute value motor has been replaced, carry out a home position return operation using one of the following methods, otherwise position displacement could occur.

1) After writing the servo data to the Motion board using programming software, switch on the power again, then perform a home position return operation.

2) Using the backup function of the programming software, load the data backed up before replacement.

- After maintenance and inspections are completed, confirm that the position detection of the absolute position detector function is correct.
- Do not short circuit, charge, overheat, incinerate or disassemble the batteries.
- The electrolytic capacitor will generate gas during a fault, so do not place your face near the Motion board or servo amplifier.
- The electrolytic capacitor and fan will deteriorate. Periodically replace these to prevent secondary damage from faults. Replacements can be made by our sales representative.

(9) About processing of waste

When you discard Motion controller, servo amplifier, a battery (primary battery) and other option articles, please follow the law of each country (area).

⚠ CAUTION

- This product is not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to forestall serious accidents when it is used in facilities where a breakdown in the product is likely to cause a serious accident.

(10) General cautions

⚠ CAUTION

- All drawings provided in the instruction manual show the state with the covers and safety partitions removed to explain detailed sections. When operating the product, always return the covers and partitions to the designated positions, and operate according to the instruction manual.

Revisions

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Jan., 2007	IB(NA)-0300122-A	First edition

Japanese Manual Number IB(NA)-0300121

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

©2006 MITSUBISHI ELECTRIC CORPORATION

INTRODUCTION

Thank you for choosing the Motion board (Q111BD-SSC/Q110BD-SSC).
Please read this manual carefully so that equipment is used to its optimum.

CONTENTS

Safety Precautions ····· A- 1
Revisions ····· A-11
Contents ····· A-12
About Manuals ····· A-15

1 OVERVIEW 1- 1 to 1- 3

1.1 Overview ····· 1- 1
1.2 Model of Applicable OS ····· 1- 2
1.3 Differences between Q111BD-SSC-Q110BD-SSC and Q173HCPU/Q172HCPU ····· 1- 2

2 SYSTEM CONFIGURATION 2- 1 to 2-18

2.1 Motion System Configuration ····· 2- 1
2.2.1 System overall configuration ····· 2- 1
2.1.2 Function explanation of the Q111BD-SSC/Q110BD-SSC Motion board ····· 2- 3
2.1.3 Restrictions on Motion systems ····· 2- 3
2.2 System Configuration Equipment ····· 2- 4
2.3 General Specifications ····· 2- 7
2.4 Specifications of Equipment and Settings ····· 2- 8
2.4.1 Name of parts for Motion board ····· 2- 8
2.4.2 SSCNET III cables and connection method ····· 2- 14

3. DESIGN 3- 1 to 3- 8

3.1 System Designing Procedure ····· 3- 1
3.2 External Circuit Design ····· 3- 4
3.2.1 Power supply circuit design ····· 3- 6
3.2.2 Safety circuit design ····· 3- 7
3.3 Installation environment ····· 3- 8

4. INSTALLATION AND WIRING 4- 1 to 4- 16

4.1 Procedure for installing Motion Board ····· 4- 1
4.2 Installation and Uninstallation of Motion Board Utility ····· 4- 2
4.2.1 Installation and Uninstallation of Motion Board Utility ····· 4- 2
4.2.2 Uninstallation of Motion Board Utility ····· 4- 4
4.2.3 Instructions when the Motion board is installed without Motion Board Utility installed ····· 4- 5
4.3 Motion board Installation ····· 4- 12
4.3.1 Instructions for handling ····· 4- 12
4.3.2 Installation and removal of Motion board ····· 4- 12
4.4 Installation and Removal of Cable ····· 4- 13
4.4.1 SSCNET III cable ····· 4- 13

4.5 Wiring ····· 4- 15
4.5.1 Instructions for wiring ····· 4- 15
4.5.2 Precautions of SSCNET III cable wiring ····· 4- 16

5. TRIAL OPERATION AND ADJUSTMENT 5- 1 to 5- 4

5.1 Checklist before Trial Operation ····· 5- 1
5.2 Trial Operation and Adjustment Procedure ····· 5- 2
5.3 Operating System Software Installation Procedure ····· 5- 4

6. MOTION BOARD UTILITY OPERATION 6- 1 to 6- 6

6.1 Start and Exit of Motion Board Utility ····· 6- 2
6.1.1 Start of Motion Board Utility ····· 6- 2
6.1.2 Exit of Motion Board Utility ····· 6- 2
6.2 Operation of Motion Board Utility ····· 6- 3

7. POSITIONING DEDICATED SIGNALS 7- 1 to 7-24

7.1 Internal Relays ····· 7- 1
7.1.1 Axis status ····· 7-.3
7.1.2 Axis command signal ····· 7- 4
7.1.3 Virtual servomotor axis status ····· 7- 5
7.1.4 Virtual servomotor axis command signal ····· 7- 6
7.1.5 Cam axis command signal ····· 7- 7
7.1.6 Smoothing clutch complete signal ····· 7- 8
7.1.7 Common device ····· 7- 9
7.2 Data Registers ····· 7-12
7.2.1 Axis monitor device ····· 7-13
7.2.2 Control change register ····· 7-14
7.2.3 Virtual servomotor axis monitor device ····· 7-15
7.2.4 Cam axis monitor device ····· 7-16
7.3 Motion Registers (#) ····· 7-17
7.4 Special Relays / Special Registers ····· 7-18
7.4.1 Special Relays(SP.M) ····· 7-18
7.4.2 Special Registers (SP.D) ····· 7-20

8. AUTO RUN FUNCTION 8- 1 to 8-16

8.1 Outline of auto run function ····· 8- 1
8.1.1 How to set the auto run function ····· 8- 1
8.2 PC monitoring function ····· 8- 2
8.2.1 Outline of PC monitoring function ····· 8- 2
8.3 Outline of WDT relay output function ····· 8- 4
8.4 Compatibility with user application ····· 8- 4
8.5 Data Batch Transfer Function between Personal Computer and Motion Board ····· 8- 5
8.5.1 Data Batch Transfer with Automatic Refresh in Operation Cycle and Main Cycle ····· 8- 6
8.5.2 Data batch transfer with Motion SFC program (BMOV instruction) ····· 8-14
8.5.3 Data Batch Transfer between Personal Computer and PCI2-Port Memory ····· 8-16

9 INSPECTION AND MAINTENANCE 9- 1 to 9-12

9.1 Battery ····· 9- 1
9.1.1 Battery service life time ····· 9- 1
9.1.2 Battery replacement procedure ····· 9- 2
9.2 Troubleshooting ····· 9- 3
9.2.1 Basics of troubleshooting ····· 9- 3
9.2.2 Troubleshooting of Motion board ····· 9- 4
9.3 Confirm method of Error Code ····· 9-11

APPENDICES App- 1 to App- 5

APPENDIX 1 Cables ····· App- 1
APPENDIX 1.1 SSCNET cables ····· App- 1
APPENDIX 2 Exterior Dimensions ····· App- 4
APPENDIX 2.1 Motion board ····· App- 4
APPENDIX 2.2 Connector ····· App- 5

About Manuals

The following manuals are related to this product.
When requesting additional manuals, please refer to this list.

Related Manuals

(1) Motion controller

Manual Name	Manual Number (Model Code)
Q173HCPU/Q172HCPU Motion controller Programming Manual (COMMON) This manual explains the Multiple CPU system configuration, performance specifications, common parameters, auxiliary/applied functions and others. (Optional)	IB-0300111 (1XB911)
Q173HCPU/Q172HCPU Motion controller (SV13/SV22) Programming Manual (Motion SFC) This manual explains the functions, programming, debugging, error codes and others of the Motion SFC. (Optional)	IB-0300112 (1XB912)
Q173HCPU/Q172HCPU Motion controller (SV13/SV22) Programming Manual (REAL MODE) This manual explains the servo parameters, positioning instructions, device list, error list and others. (Optional)	IB-0300113 (1XB913)
Q173HCPU/Q172HCPU Motion controller (SV22) Programming Manual (VIRTUAL MODE) This manual describes the dedicated instructions use to the synchronous control by virtual main shaft, mechanical system program create mechanical module. This manual explains the servo parameters, positioning instructions, device list, error list and others. (Optional)	IB-0300114 (1XB914)

(2) Servo amplifier

Manual Name	Manual Number (Model Code)
MR-J3-□B Servo Amplifier Instruction Manual This manual explains I/O signals, part names, parameters, installation procedure, etc. of the servo amplifier MR-J3-□B. (Optional)	SH-030050 (1CW201)
Fully Closed Loop MR-J3-□B-RJ006 Servo Amplifier Instruction Manual This manual provides explanations for products that take position feedback signals, which are transmitted from load side encoders such as linear encoders, into servo amplifiers, in order to perform fully closed loop control. (Optional)	SH-030056 (1CW304)

MEMO

1 OVERVIEW

1. OVERVIEW

1.1 Overview

This manual describes changes to SV13/SV22 that were incorporated with the release of the SSCNET based PCI I/F Motion Board (Q111BD-SSC/Q110BD-SSC).
Changes from earlier released SSCNETIII based Motion CPU modules (Q173HCPU/Q172HCPU) are described in principle.

In this manual, the following abbreviations are used.

Generic term/Abbreviation	Description
Q111BD-SSC/Q110BD-SSC or Motion board	Q111BD-SSC/Q110BD-SSC Motion board
Q173HCPU/Q172HCPU or Motion CPU (module)	Q173HCPU/Q172HCPU/Q173HCPU-T/Q172HCPU-T Motion CPU module
MR-J3-[ ]B	Servo amplifier model MR-J3-[ ]B
AMP or Servo amplifier	General name for "servo amplifier model MR-J3-[ ]B"
Programming software package	General name for "MT Developer" and "GX Developer"
Operating system software	General name for "SW[ ]RN-SV[ ]Q[ ]"
SV13	Operating system software for conveyor assembly use (Motion SFC) : SW6RN-SV13Q[ ]
SV22	Operating system software for automatic machinery use (Motion SFC) : SW6RN-SV22Q[ ]
SSCNET III (Note-1)	High speed synchronous network between Motion controller and servo amplifier
SSCNET (Note-1)	High speed synchronous communication network between Motion controller and servo amplifier
PCI2 port memory orPCI2 port	2-port memory between a personal computer and the motion board

(Note-1): SSCNET: Servo System Controller NETwork

REMARK

This User's Manual describes only the changes from the conventional SSCNET III compatible Motion CPU modules (Q173HCPU/Q172HCPU). Therefore, refer to the following manuals relevant to each module for information about the design methods for programs and parameters which are not described.

Item		Reference Manual
Operation method for MT Developer		Related documentation for programming support.
SV13/SV22	• Auxiliary and applied functions (common)	Q173HCPU/Q172HCPU Motion controller Programming Manual (COMMON)
SV13/SV22	• Design method for Motion SFC program • Design method for Motion SFC parameter	Q173HCPU/Q172HCPU Motion controller (SV13/SV22) Programming Manual (Motion SFC)
	• Design method for positioning control program in the real mode • Design method for positioning control parameter	Q173HCPU/Q172HCPU Motion controller (SV13/SV22) Programming Manual (REAL MODE)
SV22 (Virtual mode)	• Design method for mechanical system program	Q173HCPU/Q172HCPU Motion controller (SV22) Programming Manual (VIRTUAL MODE)

1.2 Model of Applicable OS

Board Type	OS Type	Model of OS
Q111BD-SSC	SV13	SW6RN-SV13QV
(Number of control axes: 32 axes)	SV22	SW6RN-SV22QU
Q110BD-SSC	SV13	SW6RN-SV13QT
(Number of control axes: 16 axes	SV22	SW6RN-SV22QS

1.3 Differences between Q111BD-SSC-Q110BD-SSC and Q173HCPU/Q172HCPU

Differences between Q111BD-SSC-Q110BD-SSC and Q173HCPU/Q172HCPU concerning SV13/SV22 are shown below.

(1) Motion control function (Real mode)

Item		Q111-BD-SSC	Q110-BD-SSC	Q173HCPU	Q172HCPU
Number of control axes		32 axes	16 axes	32 axes	8 axes
Operation cycle (default)	SV13	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 10 axes 1.77ms/11 to 20 axes 3.55ms/21 to 32 axes	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 10 axes 1.77ms/11 to 16 axes	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 10 axes 1.77ms/11 to 20 axes 3.55ms/21 to 32 axes	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 8 axes
	SV22	0.88ms/ 1 to 5 axes 1.77ms/6 to 14 axes 3.55ms/15 to 28 axes 7.11ms/29 to 32 axes	0.88ms/ 1 to 5 axes 1.77ms/6 to 14 axes 3.55ms/15 to 16 axes	0.88ms/ 1 to 5 axes 1.77ms/6 to 14 axes 3.55ms/15 to 28 axes 7.11ms/29 to 32 axes	0.88ms/ 1 to 5 axes 1.77ms/6 to 8 axes
Control modes		PTP(Point to Point) control, Speed control, Fixed-pitch feed, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous control (SV22)		PTP(Point to Point) control, Speed control, Speed-position control, Fixed-pitch feed, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous control (SV22)	
Home position return function		Proximity dog type (2 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type (Home position return re-try function provided, home position shift function provided)		Proximity dog type (2 types), Count type (3 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type (Home position return re-try function provided, home position shift function provided)	
Manual pulse generator operation function		None		3 units can be connected.	
Synchronous encoder operation function		None		12 units can be connected.	8 units can be connected.
Number of SSCNET III I/F		2ch	1ch	2ch	1ch
External input signal		General purpose input signal of servo amplifier FLS, RLS and DOG are used.		Q172LX or general purpose input signal of servo amplifier	
High speed reading function		None		Pulse generator and synchronous encoder I/F unit, programmable logic controller input unit	
Peripheral unit I/F		PCI bus		USB/SSCNET	
Teaching operation function		None		Provided(Q173HCPU-T/Q172HCPU-T : SV13)	

(2) Motion control function (Virtual mode)

Item				Q111BD-SSC	Q110BD-SSC	Q173HCPU	Q172HCPU
Mechanical	Drive modules	Synchronous encoder		Unusable		12 axes	8 axes
	Transmission modules	Clutch	External input mode	Unusable		Usable	

(3) Motion SFC function

Item			Q111BD-SSC	Q110BD-SSC	Q173HCPU	Q172HCPU
Motion SFC execute specification (Executed task)	Event task (Execution can be masked.)	External interrupt	None		Execute when input ON is set among interrupt module QI60 (16 points).	
		PLC interrupt	None		Execute with interrupt instruction (GINT) from PLC CPU.	
	NMI task		None		Execute when input ON is set among interrupt module QI60 (16 points).	
Motion SFC program instruction	MULTW	Write device data to shared CPU memory	None		Provided	
	MULTR	Read device data from shared CPU memory	None		Provided	
	TO	Write device data to intelligent function module/special function module.	None		Provided	
	FROM	Read device data from intelligent function module/special function module.	None		Provided	

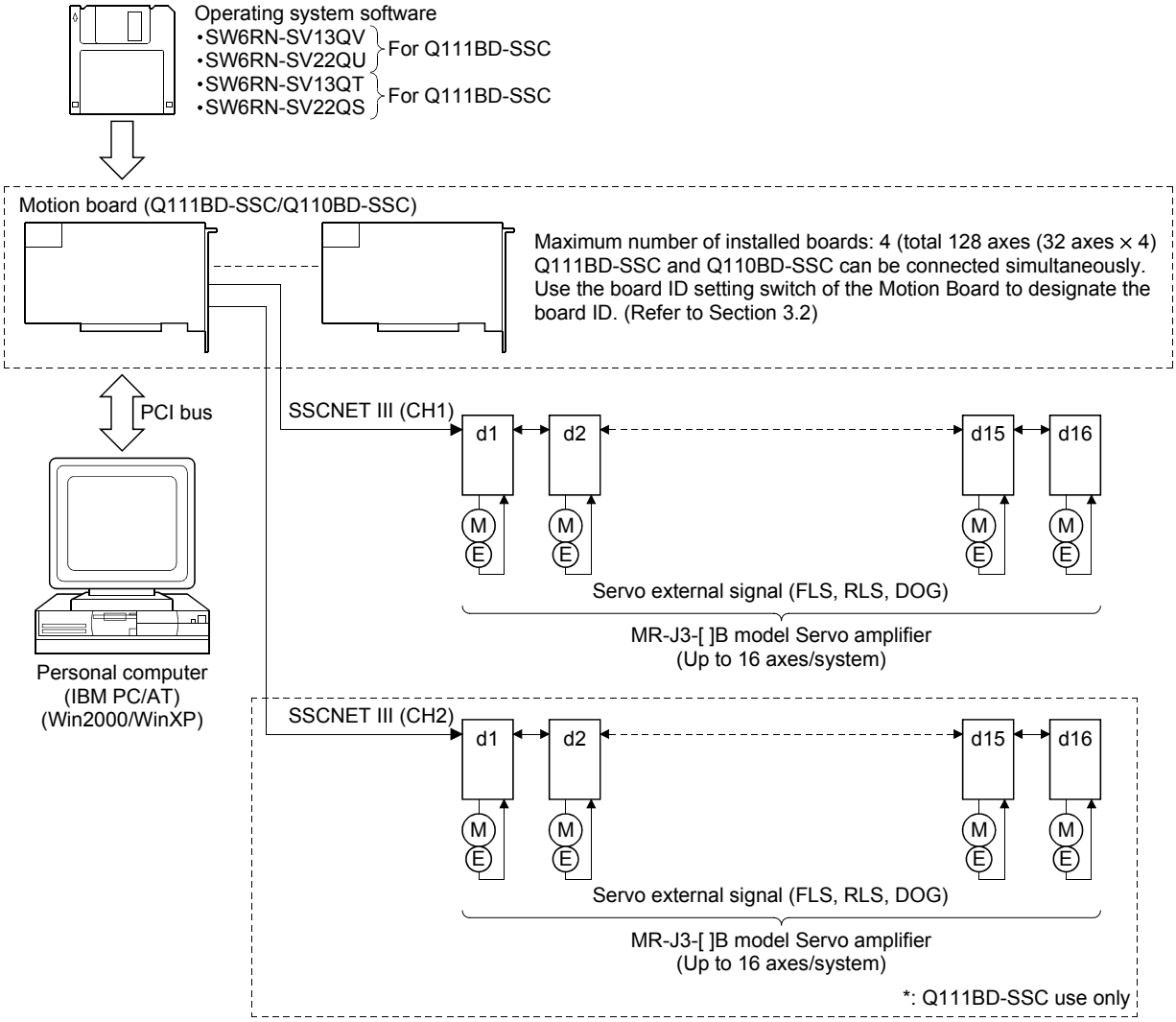
MEMO

2. SYSTEM CONFIGURATION

This section describes the Q111BD-SSC/Q110BD-SSC system configuration, precautions on use of system and configured equipments.

2.1 Motion System Configuration

2.1.1 System overall configuration



⚠ CAUTION

- Construct a safety circuit externally of the Motion controller or servo amplifier if the abnormal operation of the Motion board or servo amplifier differ from the safety directive operation in the system.
- The ratings and characteristics of the parts (other than Motion board, servo amplifier and servomotor) used in a system must be compatible with the Motion board, servo amplifier and servomotor.
- Set the parameter values to those that are compatible with the Motion board, servo amplifier, servomotor and regenerative resistor model and the system application. The protective functions may not function if the settings are incorrect.

2 SYSTEM CONFIGURATION

POINT

(1) This system does not operate in the standby mode and suspend mode provided for Windows.
Select None for the standby mode and suspend mode.

(2) Power-on and shutdown of servo amplifier
1) Keep the control power of all the servo amplifiers connected to the Motion board turned on during operation. Otherwise servo amplifiers connected to servo amplifiers later than the one turned off do not communicate with the Motion board.
(Note): Even if there is a servo amplifier that is not registered to the system (not used) in the middle, keep the control power of the servo amplifier turned on. If it is turned off, communication is not made with the servo amplifiers connected later than the one that is turned off.
2) If the control power of the servo amplifier is turned off during operation, Motion CPU stops communicating with the servo amplifiers later than the one that is turned off, and those servo amplifiers are in the servo-off state.
(Note): The servo amplifiers connected earlier than the one that is turned off keep operating without any effects.
3) If the control power of the shutoff servo amplifier is turned on again after the event specified in above item 1, Motion board restarts communicating with the servo amplifiers that have been disconnected.
4) There is no limitation in the power-on sequence of the Motion board and servo amplifiers.

(3) Rotary switch setting of servo amplifier
1) There is no need to arrange servo amplifiers in the order of the rotary switch setting of the servo amplifier.
2) Specify so that axis d1 of the Motion board system setting is "0," axis d2 "1," and axis d16 "F".

(4) External signal input
1) The upper limit switch, lower limit switch and near-point dog signal of each axis can be entered, using the general purpose inputs of each servo amplifier.

2.1.2 Function explanation of the Q111BD-SSC/Q110BD-SSC Motion board

(1) Up to 32 axes servo amplifiers per 2 systems (up to 16 axes per 1 system) can be used in Q111BD-SSC. Up to 16 axes servo amplifiers per 1 system can be used in Q110BD-SSC.

(2) It is possible to set the program which synchronized with the motion operation cycle and executed at fixed cycle (0.88[ms], 1.77[ms], 3.55[ms], 7.11[ms], 14.2[ms]).

(3) It is possible to execute a download of servo parameters to servo amplifier, servo ON/OFF to servo amplifier and position commands, etc. by connecting between the Q111BD-SSC/Q110BD-SSC and servo amplifier with SSCNET III cable.

(4) It is possible to select the servo control functions/programming languages by installing the corresponding operating system software in the Q111BD-SSC/ Q110BD-SSC.

(5) Motion board becomes difficult to be influenced of an electromagnetic noise from servo amplifier, etc. by using the SSCNET III cable (optical communication).

2.1.3 Restrictions on Motion systems

(1) When the operation cycle is 0.4[ms], set the system setting as the axis select switch of servo amplifier "0 to 7".
If the axis select switch of servo amplifier "8 to F" is set, the servo amplifiers are not recognized.

2.2 System Configuration Equipment

(1) Table of Motion board related module

Part name	Model Name	Description
Motion board	Q111BD-SSC	Up to 32 axes control, Operation cycle 0.4[ms] or more
	Q110BD-SSC	Up to 16 axes control, Operation cycle 0.4[ms] or more
Battery	Q6BAT	For IC-RAM memory backup of Q111BD-SSC/Q110BD-SSC (Motion SFC programs, Servo programs, Parameters)
SSCNET III cable	MR-J3BUSΔM (Note-1)	• Q111BD-SSC/Q110BD-SSC ↔ MR-J3-[ ]B • MR-J3-[ ]B ↔ MR-J3-[ ]B • Standard code for inside panel • 0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3,28ft.), 3m(9.84ft.)
	MR-J3BUSΔM-A (Note-1)	• Q111BD-SSC/Q110BD-SSC ↔ MR-J3-[ ]B • MR-J3-[ ]B ↔ MR-J3-[ ]B • Standard cable for outside panel • 5m (16.40ft.), 10m (32.81ft.), 20m(65.62ft.)
	MR-J3BUSΔM-B (Note-2) (Note-1)	• Q111BD-SSC/Q110BD-SSC ↔ MR-J3-[ ]B • MR-J3-[ ]B ↔ MR-J3-[ ]B • Long distance cable • 30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)

(Note-1): Δ=Cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 2: 2m (6.56ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50:50m (164.04ft.)

(Note-2): Please contact your nearest Mitsubishi sales representative for the cable of less than 30m(98.43ft.).

(2) Table of servo amplifier

Part name	Model Name	Description
MR-J3 series servo amplifier	MR-J3-□B	Refer to the catalog of the servo amplifier.
Battery	MR-J3BAT	Back-up for the absolute position detection

(3) Software packages

(a) Operating system software packages

Application	Software Package	
	Q111BD-SSC	Q110BD-SSC
For conveyor assembly SV13 (Motion SFC)	SW6RN-SV13QV	SW6RN-SV13QT
For automatic machinery SV22 (Motion SFC)	SW6RN-SV22QU	SW6RN-SV22QS

(b) Integrated start-up support software package

Application	Software Package	
SW6RNC-GSVPROE-E0011	SW6RNC-GSVE-E0011 (Integrated start-up support software (1 CD-ROM))	• Conveyor assembly software : SW6RN-GSV13P-E0011 • Automatic machinery software : SW6RN-GSV22P-E0011 • Cam data creation software : SW3RN-CAMP • Digital oscilloscope software : SW6RN-DOSCP-E0011 • Communication system software : SW6RN-SNETP-E0011 • Document print software : SW3RN-DOCPRNP SW20RN-DOCPRNP • Motion Board Utility
	SW6RNC-GSVHELPE-E0011 (Operation manual (1 CD-ROM))	• Operation manual : SW6RNC-GSVHELP-E0011
	Installation manual	

(Note): Operating environment of the programming software is Windows® 2000/Windows® XP Japanese version) only.

(4) Operating environment of personal computer

(a)Operating environment of the Motion board

The operating environment of the Motion board is shown below.

Item	Description	
	Q111BD-SSC	Q110BD-SSC
Bus type	PCI	
Address bit	32bit	
Data bit	32bit	
System clock	33MHz	
System voltage	+5V	
Measure [mm(inch)]	106.7 (4.20) × 174.6 (6.87)	
Hot swap	Not compatible	
Base address	Set the configuration register using BIOS.	
Current consumption (5VDC) [A]	1.01	0.77

(b)System requirements of integrated start-up support software package

The system requirements of integrated start-up support software package is shown in the following.

IBM PC/AT with which Windows® 2000/Windows® XP English version operates normally.

Item	Windows® 2000	Windows® XP
CPU	Pentium II 233MHz or more	Pentium II 450MHz or more
Memory capacity	Recommended 64MB or more	Recommended 192MB or more
Hard disk free space	* Refer to the following table in Section 1) SW6RN-GSVPROE-E0011.	
Disk drive	3.5inch (1.44MB) floppy disk drive, CD-ROM disk drive	
Display	800×600 pixels, 256 colors or more	

(Note-1) : Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

(Note-2) : Pentium® are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

It is necessary the following capacity depending on the installed software.

1) SW6RN-GSVPROE-E0011

Model Name	Size		
	SW6RNC-GSVE-E0011		SW6RNC-GSVHELPE-E0011
SW6RN-GSV13P-E0011	40MB		23MB
SW6RN-GSV22P-E0011	40MB		25MB
SW3RN-CAMP	2MB		3MB
SW6RN-DOSCP-E0011	10MB		5MB
SW6RN-SNETP-E0011	Standard	4MB	3MB
	Custom (When all selection)	5MB	
SW3RN-DOCPRNP	34MB		4MB
SW20RN-DOCPRNP	33MB		4MB

2) Motion board Utility

Model Name	Size
Motion board Utility	1MB

(5) Related software packages

(b) Servo set up software package

Model Name	Software Package	Version
MR Configurator	MRZJW3-SETUP221	B1 or later

POINT

(1) When the operation of Windows is not unclear in the operation of this software, refer to the manual of Windows or guide-book from the other supplier.

(2) The screen might not be correctly displayed depending on the system font size of Windows® 2000/ Windows® XP.
Be sure to use the small size fonts.

(3) Although SW6RNC-GSVE and SW6RNC-GSVE-E0011 can be installed on the same personal computer, they cannot be started simultaneously.

2.3 General Specifications

General specifications of Q111BD-SSC/Q110BD-SSC module are shown below.

Item	Specification
Operating ambient temperature	0 to 55°C (32 to 131°F)
Storage ambient temperature	-20 to 65°C (-13 to 149°F)
Operating ambient humidity	10 to 90% RH, non-condensing
Storage ambient humidity	10 to 90% RH, non-condensing
Operating ambience	No corrosive gases
Cooling method	Natural air-cooling
Power supply	Power supply voltage 5VDC±5%

⚠ CAUTION

- The Motion board must be stored and used under the conditions listed in the table of specifications above.
- When not using the module for a long time, disconnect the power line from the servo amplifier.
- Place the Motion board and servo amplifier in static electricity preventing vinyl bags and store.
- When storing for a long time, please contact with our sales representative.

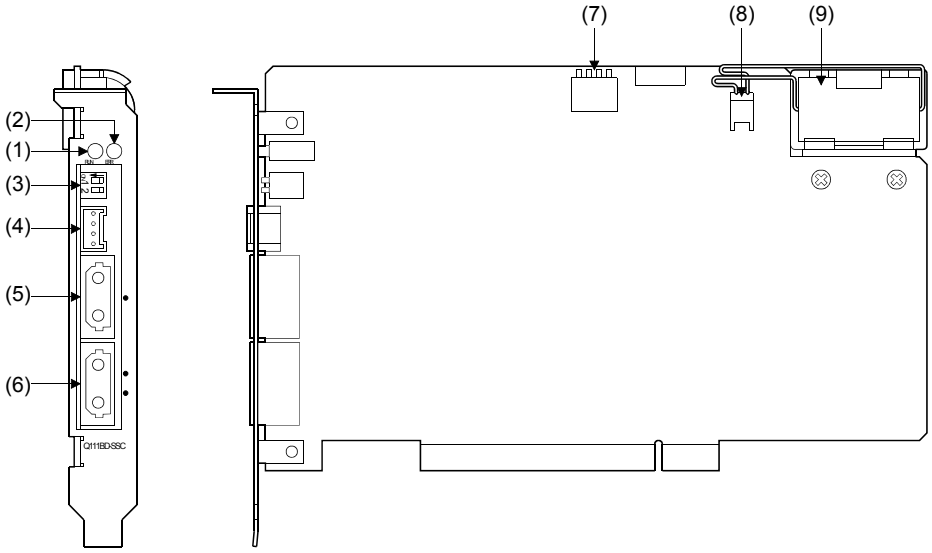
2.4 Specifications of Equipment and Settings

2.4.1 Name of parts for Motion board

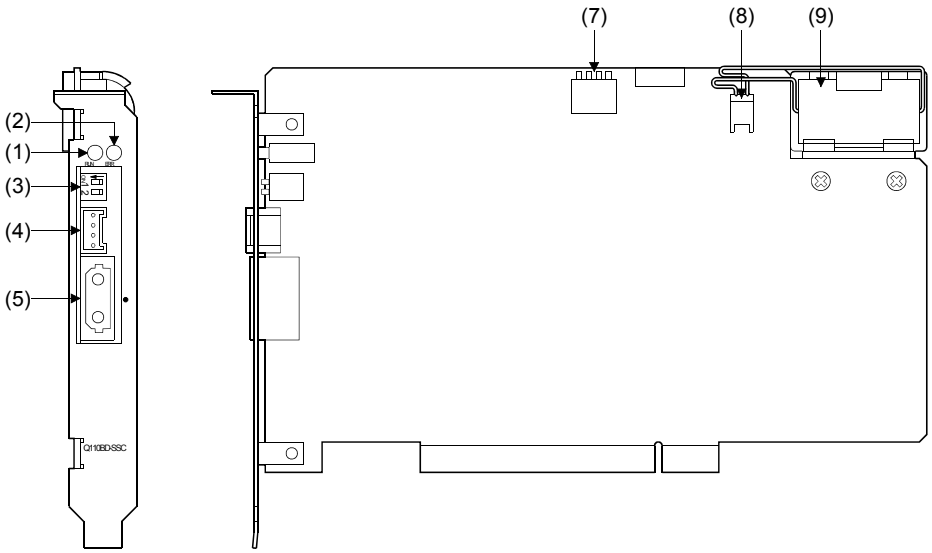
This section explains the names and setting of the Motion board.

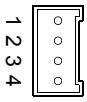
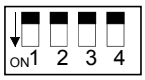
(1) Name of parts for Q111BD-SSC/Q110BD-SSC

- Q111BD-SSC



- Q110BD-SSC



<table>
<tr><th>No.</th><th>Name</th><th colspan="2">Application</th></tr>
<tr><td>(1)</td><td>RUN LED</td><td colspan="2">• Lit : Motion board normal start
• Not lit : LED turns off at following error occurrence.
1) LED turns off when the trouble occurred at Motion CPU start.
2) WDT error occurrence.</td></tr>
<tr><td>(2)</td><td>ERR.LED</td><td colspan="2">• Lit : LED turns on at following error occurrence.
1) WDT error
2) System setting error
3) Servo error
4) Personal computer monitoring error
• Not lit : Normal</td></tr>
<tr><td rowspan="2">(3)</td><td rowspan="2">Mode setting dip switch
 </td><td>Dip switch 1
(Switch for Installation)</td><td>Turn ON dip switch 1 when installed the operating system software into the Motion board from the peripheral device.
After completing the installation, move to switch and re-start.
ON : Installation mode/mode written in ROM
OFF : Normal mode (Mode operated by RAM/Mode operated by ROM)</td></tr>
<tr><td>Dip switch 2
(Switch for ROM operation setting)</td><td>ON : Mode operated by ROM
OFF : Mode operated by RAM</td></tr>
<tr><td>(4)</td><td>External input signal connector
  </td><td colspan="2">Connector for watchdog timer output (relay output) and emergency stop input
• EMG, WDT connector pin layout
<table>
<tr><th>PIN No.</th><th>Signal Name</th><th>Description</th></tr>
<tr><td>1</td><td>EMG.</td><td rowspan="2">Turning off the circuit between EMG. and EMG.C makes an emergency stop. Applying 24VDC to the circuit between EMG. and EMG.C cancels an emergency stop.
EMG.C is common for EMG. signals. This signal is disabled unless emergency stop input is made valid in basic settings of the system settings.</td></tr>
<tr><td>2</td><td>EMG.C</td></tr>
<tr><td>3</td><td>WDT.</td><td rowspan="2">WDT. is turned on when a watch dog timer error has occurred.
WDT. is turned off when no watch dog timer error has occurred.
WDT.C is common for WDT. signals.</td></tr>
<tr><td>4</td><td>WDT.C</td></tr>
</table></td></tr>
<tr><td>(5)</td><td>SSCNET III connector
(for CH 1)</td><td colspan="2">Connector to connect between Motion board and servo amplifier of system 1 (up to 16 axes)</td></tr>
<tr><td>(6)</td><td>SSCNET III connector
(for CH 2)</td><td colspan="2">Connector to connect between Motion board and servo amplifier of system 2 (up to 16 axes)</td></tr>
<tr><td>(7)</td><td>Board ID No. setting dip switch
  </td><td colspan="2">Correspondence between dip switches and board IDs
<table>
<tr><th rowspan="2">Board ID No.</th><th colspan="4">Dip Switch No.</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>0</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1</td><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>2</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>3</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
</table>(Note): 3, 4 is not used</td></tr>
<tr><td>(8)</td><td>Battery connector</td><td colspan="2">For connection of battery lead wire.</td></tr>
<tr><td>(9)</td><td>Battery (Q6BAT)</td><td colspan="2">For IC-RAM memory backup.</td></tr>
</table>

(2) Basic specifications of Q111BD-SSC/Q110BD-SSC

Item		Q111BD-SSC	Q110BD-SSC
Internal current consumption (5VDC) [A]		1.01	0.77
Mass [kg]		0.17	0.16
Exterior dimensions [mm(inch)]		106.7 (4.20) × 174.6 (6.87)	106.7 (4.20) × 174.6 (6.87)
Bus specifications	Bus type	PCI	
	Address bit	32bit	
	Data bit	32bit	
	System clock	33MHz	
	System voltage	+5V	
	Hot swap	Not compatible	
	Base address	Set the configuration register using BIOS.	

(3) Motion control specifications/performance specifications

(a) Motion control specifications

Item		Q111BD-SSC	Q110BD-SSC
Number of control axes		32 axes	16 axes
Operation cycle (default)	SV13	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 10 axes 1.77ms/11 to 20 axes 3.55ms/21 to 32 axes	0.44ms/ 1 to 3 axes 0.88ms/ 4 to 10 axes 1.77ms/11 to 16 axes
	SV22	0.88ms/ 1 to 5 axes 1.77ms/6 to 14 axes 3.55ms/15 to 28 axes 7.11ms/29 to 32 axes	0.88ms/ 1 to 5 axes 1.77ms/6 to 14 axes 3.55ms/15 to 16 axes
Interpolation functions		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)	
Control modes		PTP(Point to Point) control, Speed control, Fixed-pitch feed, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous control (SV22)	
Acceleration/ deceleration control		Automatic trapezoidal acceleration/deceleration, S-curve acceleration/deceleration	
Compensation		Backlash compensation, Electronic gear, Phase compensation (SV22)	
Programming language		Motion SFC, dedicated instruction, Mechanical support language (SV22)	
Servo program capacity		14k steps	
Number of positioning points		3200 points (Positioning data can be designated indirectly)	
Peripheral I/F		PCI bus	
Home position return function		Proximity dog type (2 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type (Home position return re-try function provided, home position shift function provided)	
JOG operation function		Provided	
Manual pulse generator operation function		None	
Synchronous encoder operation function		None	
M-code function		M-code output function provided, M-code completion wait function provided	
Limit switch output function		Number of output points 32 points Watch data: Motion control data/Word device	
Absolute position system		Made compatible by setting battery to servo amplifier. (Possible to select the absolute data method or incremental method for each axis)	
Number of SSCNET III系統数		2ch	1ch

(b) Mechanism program specifications(SV22)

Item			Q111BD-SSC		Q110BD-SSC	
Control unit	Drive modules	Virtual servo motor	PLS			
	Output module	Roller	mm, inch			
		Ball screw				
		Rotary table	Degree fixation			
		Cam	mm, inch, PLS			
Mechanism program	Drive modules	Virtual servomotor	32	total 32	16	total 16
	Virtual axis	Virtual main shaft	32	total 64	16	total 32
		Virtual auxiliary input	32		16	
	Transmission modules	Gear*1	64		32	
		Clutch*1,*3	64		32	
		Change gear *1	64		32	
		Differential gear*1	32		32	
		Differential gear (for connecting the virtual main shaft)*2	32		32	
	Output module	Cam	32	total 32	16	total 16
		Roller	32		16	
		Ball screw	32		16	
		Rotary table	32		16	
Cam	type		Up to 256			
	1-cycle resolution		256,512,1024,2048			
	Memory capacity		132k bytes			
	Resolution of stroke amount		32767			
	Control mode		Bi-directional cam, feed cam			

(Note-1) : Only one gear, clutch, change gear and differential gear module can be used for each output module.
(Note-2) : Only one differential gear module for the virtual main shaft can be used for each main shaft.
(Note-3) : Clutches cannot be set for an external input mode.

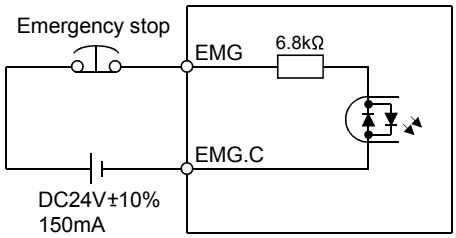
(c) Motion SFC performance specifications

Item				Q111BD-SSC/Q110BD-SSC
Motion SFC program capacity	Code total (Motion SFC chart+Operation control+Transition)			543k bytes
	Text total (Operation control+Transition)			484k bytes
Motion SFC program	Number of Motion SFC programs			256 (No.0 to 255)
	Motion SFC chart size/program			Up to 64k bytes (Included Motion SFC chart comments)
	Number of Motion SFC steps/program			Up to 4094 steps
Operation control program (F/FS) / Transition program (G)	Number of operation control programs			4096 with F (Once execution type) and FS (Scan execution type) combined. (F/FS0 to F/FS4095)
	Number of transition programs			4096(G0 to G4095)
	Code size/program			Up to approx. 64k bytes (32766 steps)
	Number of blocks(line)/program			Up to 8192 blocks (in the case of 4 steps(min)/blocks)
	Descriptive	Operation control program		Calculation expression/bit conditional expression
		expression Transition program		Calculation expression/bit conditional expression/ comparison conditional expression
Execute specification	Number of multi execute programs			Up to 256
	Number of multi active steps			Up to 256 steps/all programs
	Executed task	Normal task		Execute in motion main cycle
		Event task (Execution can be masked.)	Fixed cycle	Execute in fixed cycle (0.88ms, 1.77ms, 3.55ms, 7.11ms, 14.2ms)
			External interrupt	None
			PLC interrupt	None
		NMI task		None

(4) Connection examples of I/O signals

(a) Emergency stop input

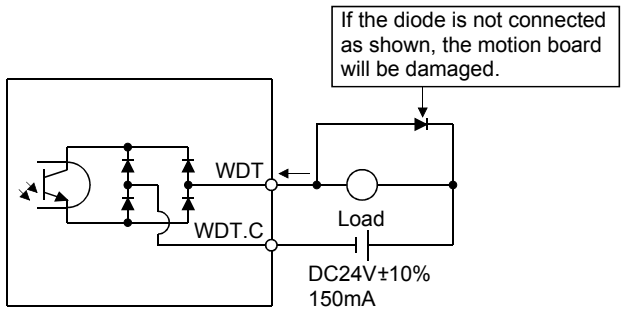
For an external circuit that is used to transmit emergency stop signals, refer to Section 3.2.



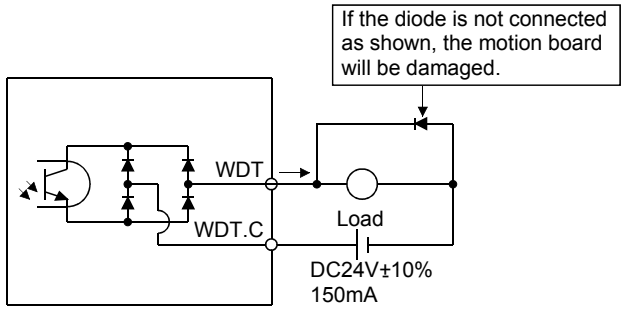
(b) Watchdog timer output

A lamp relay or photocoupler can be driven. Provide a diode (D) for an inductive load, and an inrush current suppressing resister (R) for a lamp load. (Permissible current: 40mA or less, Inrush current: 100mA or less)
The voltage effect inside the motion board is maximum 2.6V.

1) For sink output



2) For source output



- Applicable connector model name
  51103-0400 housing
  50351-8000 terminal
  (Molex Japan Co., Ltd. make)

Purchase this connector separately.

(5) Connection of the battery

This section describes the battery specifications, handling precautions and installation of the Motion board.

(a) Specifications

The specifications of the battery for memory back-up are shown in the table below.

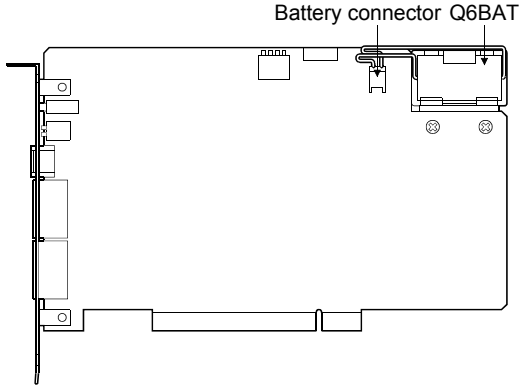
Battery Specifications

Item \ Model Name	Q6BAT
Classification	Manganese dioxide lithium primary battery
Normal voltage[V]	3.0
Battery discharge capacity [mAh]	1800
Battery warranty period	Actually 5 years (Room temperature)
Lithium content [g]	0.49
Applications	Used for Q111BD-SSC/Q110BD-SSC internal IC-RAM memory backup
Exterior dimensions [mm (inch)]	ϕ16 (0.63) $\times$ 32 (1.26)

(Note): The 44th Edition of the IATA (International Air Transportation Association) Dangerous Goods Regulations was effected in January 1st, 2003 and administered immediately.
In this edition, the provisions relating to lithium and lithium ion batteries have been revised to strengthen regulations on the air transportation of battery.
This battery is not dangerous goods (not class 9). Therefore, these batteries of 24 units or less are not subject to the regulations.
These batteries more than 24 units require packing based on Packing Instruction 903.
If you need the self-certification form for the battery safety test, contact Mitsubishi.
For more information, contact Mitsubishi.

(b) Battery replacement

For Battery replacement procedure, refer to section 9.1.2.



(c) Battery service life time

Model Name	Battery Service Life Time	
	Guaranteed Time (MIN) [h]	Actual Time(TYP) [h]
Q6BAT	43800	87600

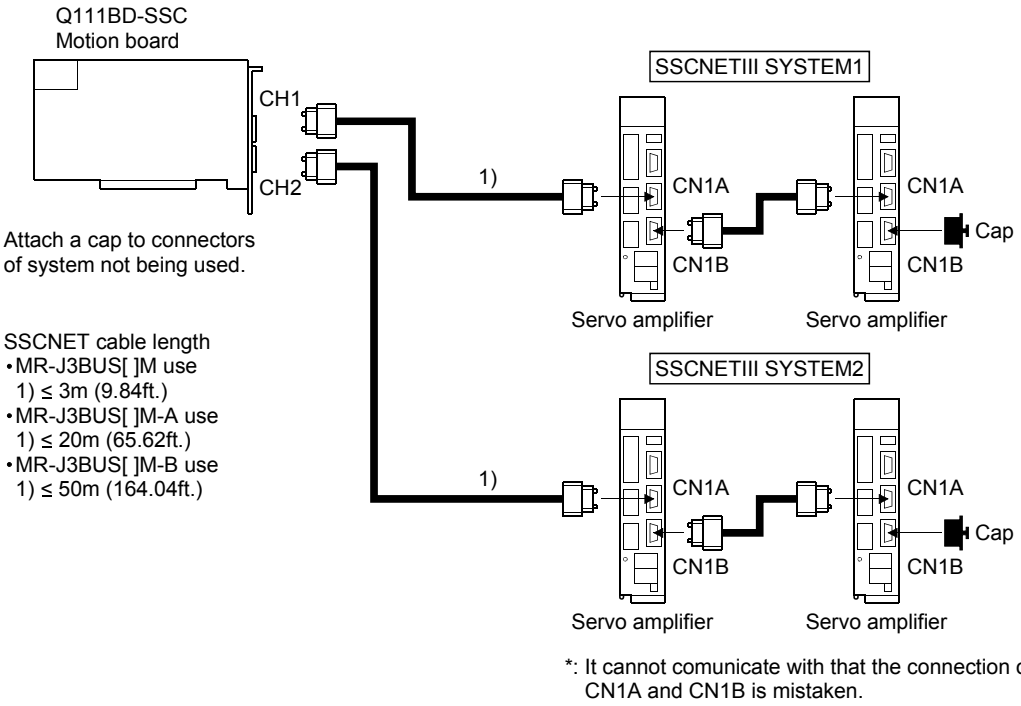
⚠ CAUTION

- Do not short a battery.
- Do not charge a battery.
- Do not disassemble a battery.
- Do not burn a battery.
- Do not overheat a battery.
- Do not solder to the battery terminals.

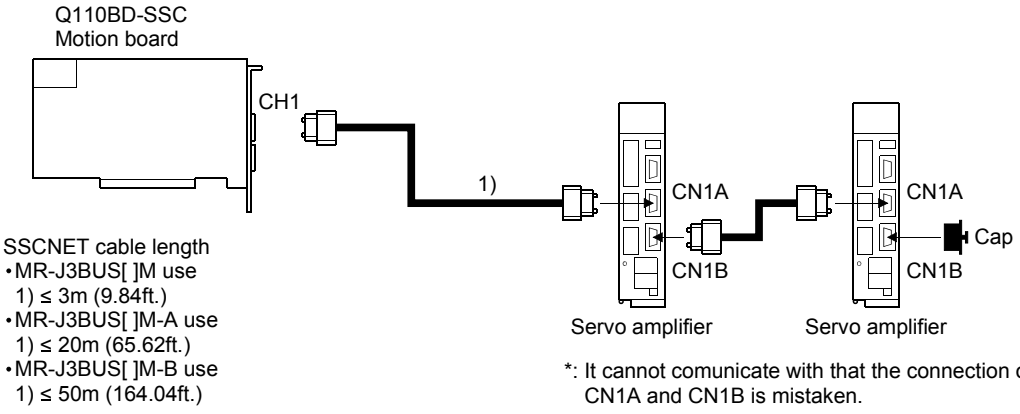
2.4.2 SSCNET III cables and connection method

This section describes how to connect between the Motion board and servo amplifiers.
Between the Motion board and servo amplifiers is connected by SSCNETIII cable.
When using the Q110BD-SSC, only 1 SSCNET III cable for connection to servo amplifier can be used. (Connect to CH1.) When using the Q111BD-SSC, up to 2 SSCNET III cables for connection to servo amplifier can be used. (Connect to CH1 and CH2.)
Up to 16 servo amplifies can be connected to 1 SSCNET III cable.

(1) Connection between the Q111BD-SSC and servo amplifiers



(2) Connection between the Q110BD-SSC and servo amplifiers



List of SSCNET III cable model name

Model Name (Note)	Cable Length	Description	
MR-J3BUSΔM	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft.)	Standard code for inside panel	• Q111BD-SSC/Q110BD-SSC ↔ MR-J3-[ ]B • MR-J3-[ ]B ↔ MR-J3-[ ]B
MR-J3BUSΔM-A	5m (16.4ft.), 10m (32.81ft.), 20m (65.62ft.)	Standard cable for outside panel	
MR-J3BUSΔM-B	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	Long distance cable	

(Note): Δ = cable length

POINT

(1) Be sure to connect SSCNET III cable with the connecter shown on the previous page. If the connection is mistaken, between the Motion board and servo amplifier cannot be communicated.
(2) SSCNET III connector is put a cap to protect light device inside connector from dust. For this reason, do not remove a cap until just before mounting SSCNET III cable. Then, when removing SSCNET III cable, make sure to put a cap.
(3) Be sure to keep a cap and the tube for protecting light code end of SSCNET III cable in a plastic bag with a zipper of SSCNET III cable to prevent them from becoming dirty.
(4) Do not remove the SSCNET III cable while turning on the power supply of Motion board and servo amplifier.
Do not see directly the light generated from the end of SSCNET III cable. When the light gets into eye, may feel something is wrong for eye. (The light source of SSCNET III cable corresponds to class1 defined in JISC6802 or IEC60825-1.)
(5) When exchanging the servo amplifier or Motion board, make sure to put a cap on SSCNET III connector. When asking repair of servo amplifier or Motion board for some troubles, make also sure to put a cap on SSCNET III connector. When the connector is not put a cap, the light device may be damaged at the transit. In this case, exchange and repair of light device is required.

(3) Cable specifications

(a) MR-J3BUS□M

Item \ Model Name	MR-J3BUS015M	MR-J3BUS03M	MR-J3BUS05M	MR-J3BUS1M	MR-J3BUS3M
Cable length [m(ft.)]	0.15 (0.49)	0.3 (0.98)	0.5 (1.64)	1 (3.28)	3 (9.84)

(b) MR-J3BUS□M-A

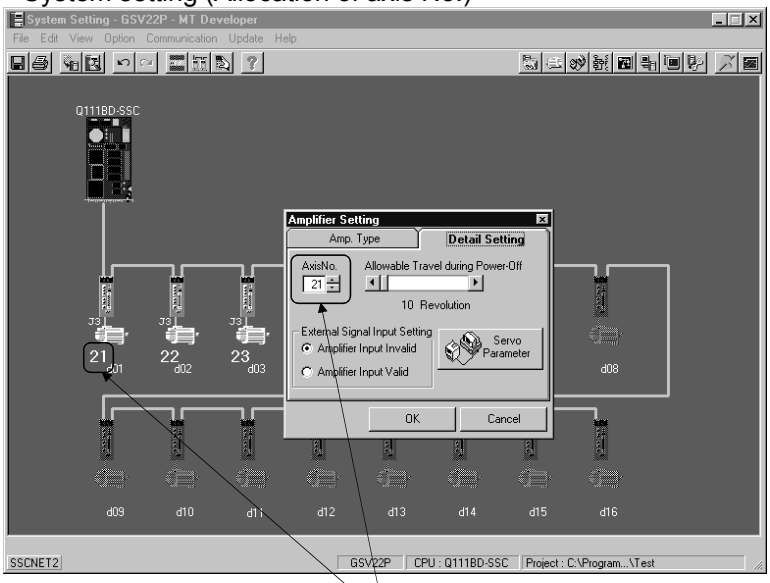
Item \ Model Name	MR-J3BUS5M-A	MR-J3BUS10M-A	MR-J3BUS20M-A
Cable length [m(ft.)]	5 (16.40)	10 (32.81)	20 (65.62)

(c) MR-J3BUS□M-B

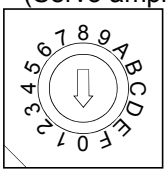
	MR-J3BUS30M-B	MR-J3BUS40M-B	MR-J3BUS50M-B
Cable length [m(ft.)]	30 (98.43)	40 (131.23)	50 (164.04)

(4) Setting of the axis No. and axis select switch of servo amplifier
Axis No. is used to set the axis numbers of servo amplifiers connected to SSCNET III connector(CH ☐) in the program.
Axis No. of 1 to 32 can be set for Q111BD-SSC, and axis No. of 1 to 16 can be set for Q110BD-SSC.
Axis No. is set for each system of SSCNET III in the system setting of programming software. Axis No. (Q111BD-SSC: 1 to 32/Q110BD-SSC: 1 to 16) is allocated and set for the setting axis number (d01 to d16) of servo amplifier.
Since the axis number (d01 to d16) of servo amplifier on the system setting screen corresponds to axis select switch (0 to F) of servo amplifier, set the axis select switch referring to the table of next page.

• System setting (Allocation of axis No.)



• Axis select switch (Servo amplifier)



•Set the axis No. relative to axis number (dno.).

(Note): Correspondence between dno. and axis select switch of servo amplifiers is shown in the next page.

Correspondence between dno.s and axis select switches of servo amplifier

dno. (Note)	SSCNET III System	Axis Select Switch of Servo Amplifier
d01	1	"0"
d02	1	"1"
d03	1	"2"
d04	1	"3"
d05	1	"4"
d06	1	"5"
d07	1	"6"
d08	1	"7"
d09	1	"8"
d10	1	"9"
d11	1	"A"
d12	1	"B"
d13	1	"C"
d14	1	"D"
d15	1	"E"
d16	1	"F"

dno. (Note)	SSCNET III System	Axis Select Switch of Servo Amplifier
d01	2	"0"
d02	2	"1"
d03	2	"2"
d04	2	"3"
d05	2	"4"
d06	2	"5"
d07	2	"6"
d08	2	"7"
d09	2	"8"
d10	2	"9"
d11	2	"A"
d12	2	"B"
d13	2	"C"
d14	2	"D"
d15	2	"E"
d16	2	"F"

(Note): The dno. is axis number of servo amplifier displayed in the system setting of programming software. Axis No. is set relative to dno. in the system settings.

Correspondence between SSCNET III system and connector No. of CPU is shown below.

Correspondence between SSCNET III system No. and connector No. of CPU

SSCNET III System No.	Connector No. of Motion Board	
1	SSCNET III CH1	•
2	SSCNET III CH2	⋮

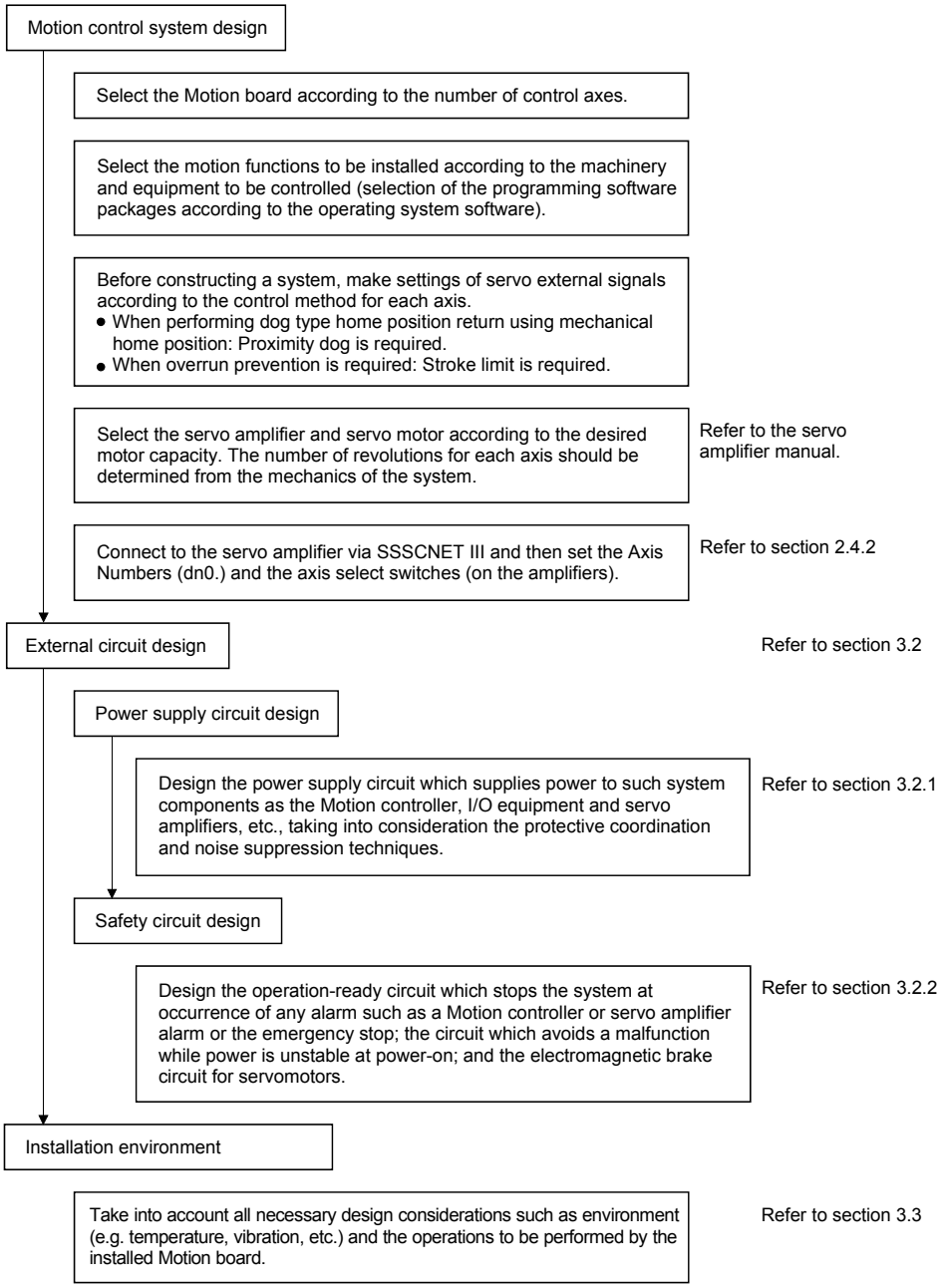
(Note): Number of SSCNET III systems: Q111BD-SSC : 2 systems / Q110BD-SSC : 1 system

MEMO

3. DESIGN

3.1 System Designing Procedure

(1) Design the system which uses the Motion board in the following procedure.


Motion control system design
Select the Motion board according to the number of control axes.
Select the motion functions to be installed according to the machinery and equipment to be controlled (selection of the programming software packages according to the operating system software).
Before constructing a system, make settings of servo external signals according to the control method for each axis.
● When performing dog type home position return using mechanical home position: Proximity dog is required.
● When overrun prevention is required: Stroke limit is required.
Select the servo amplifier and servo motor according to the desired motor capacity. The number of revolutions for each axis should be determined from the mechanics of the system.
Refer to the servo amplifier manual.
Connect to the servo amplifier via SSSCNET III and then set the Axis Numbers (dn0.) and the axis select switches (on the amplifiers).
Refer to section 2.4.2
External circuit design
Refer to section 3.2
Power supply circuit design
Design the power supply circuit which supplies power to such system components as the Motion controller, I/O equipment and servo amplifiers, etc., taking into consideration the protective coordination and noise suppression techniques.
Refer to section 3.2.1
Safety circuit design
Design the operation-ready circuit which stops the system at occurrence of any alarm such as a Motion controller or servo amplifier alarm or the emergency stop; the circuit which avoids a malfunction while power is unstable at power-on; and the electromagnetic brake circuit for servomotors.
Refer to section 3.2.2
Installation environment
Take into account all necessary design considerations such as environment (e.g. temperature, vibration, etc.) and the operations to be performed by the installed Motion board.
Refer to section 3.3

⚠ CAUTION

- Provide appropriate circuits external to the Motion board to prevent cases where danger may result from abnormal operation of the overall system in the event of an external power supply fault or Motion board failure.
- Install the servo amplifier, servomotor, and regenerative resistor on nonflammable material. Direct installation on flammable material or near flammable material may lead to fire.

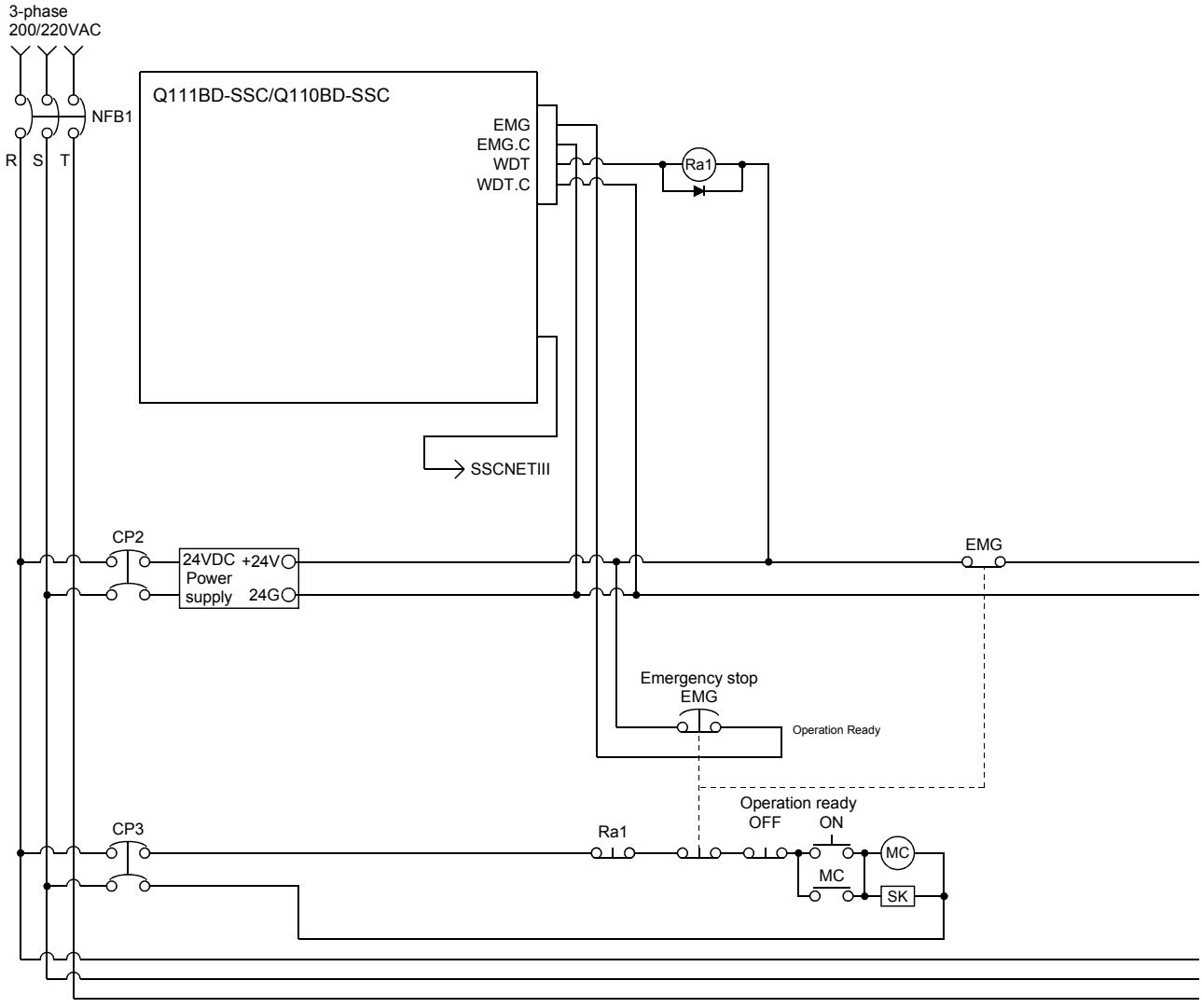
⚠ CAUTION

- If a fault occurs in the Motion board or servo amplifier, shut the power OFF at the servo amplifier's power source. If a large current continues to flow, fire may occur.
- When using a regenerative resistor, shut the power OFF with an error signal. The regenerative resistor may abnormally overheat due to a fault in the regenerative transistor, etc., and may lead to fire.
- Always take heat measures such as flame proofing for the inside of the control panel where the servo amplifier or regenerative resistor is installed and for the wires used. Failing to do so may lead to fire.
- Do not apply a voltage other than that specified in the instruction manual on any terminal. Doing so may lead to destruction or damage.
- Do not mistake the polarity (+ / -), as this may lead to destruction or damage.
- Do not touch the servo amplifier's heat radiating fins, regenerative resistor and servomotor, etc. while the power is ON and for a short time after the power is turned OFF. These parts become very hot and may lead to burns during these times.
- Always turn the power OFF before touching the servomotor shaft or coupled machines, as these parts may lead to injuries.
- Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.
- Always install a leakage breaker on the servo amplifier power source.
- If installation of an electromagnetic contactor for power shut off during an error, etc., is specified in the instruction manual for the servo amplifier, etc., always install the electromagnetic contactor.
- Install an emergency stop circuit externally so that the operation can be stopped immediately and the power shut off.
- Use the Motion board, servo amplifier, servomotor and regenerative resistor with the combinations listed in the instruction manual. Other combinations may lead to fire or faults.
- If safety standards (ex., robot safety rules, etc.,) apply to the system using the Motion board, servo amplifier and servomotor, make sure that the safety standards are satisfied.
- Construct a safety circuit externally of the Motion board or servo amplifier if the abnormal operation of the Motion board or servo amplifier differs from the safety directive operation in the system.
- In systems where coasting of the servomotor will be a problem during the forced stop, the emergency stop, servo OFF or when the power is shut OFF, use dynamic brakes.
- Make sure that the system considers the coasting amount even when using dynamic brakes.
- In systems where perpendicular shaft dropping may be a problem during the forced stop, the emergency stop, servo OFF or when the power is shut OFF, use both dynamic brakes and electromagnetic brakes.
- The dynamic brakes must be used only during the forced stop, the emergency stop and errors where servo OFF occurs. These brakes must not be used for normal braking.
- The brakes (electromagnetic brakes) assembled into the servomotor are for holding applications, and must not be used for normal braking.
- The system must have a mechanical allowance so that the machine itself can stop even if the stroke limits switch is passed through at the max. speed.
- Use wires and cables that have a wire diameter, heat resistance and bending resistance fully compatible with the system.
- Use wires and cables within the length of the range described in the instruction manual.
- The ratings and characteristics of the parts (other than Motion board, servo amplifier, servomotor) used in a system must be compatible with the Motion board, servo amplifier and servomotor.
- Install a cover on the shaft so that the rotary parts of the servomotor are not touched during operation.
- There may be some cases where holding by the electromagnetic brakes is not possible due to the service life time or mechanical structure (when the ball screw and servomotor are connected with a timing belt, etc.). Install a stopping device to ensure safety on the machine side.

MEMO

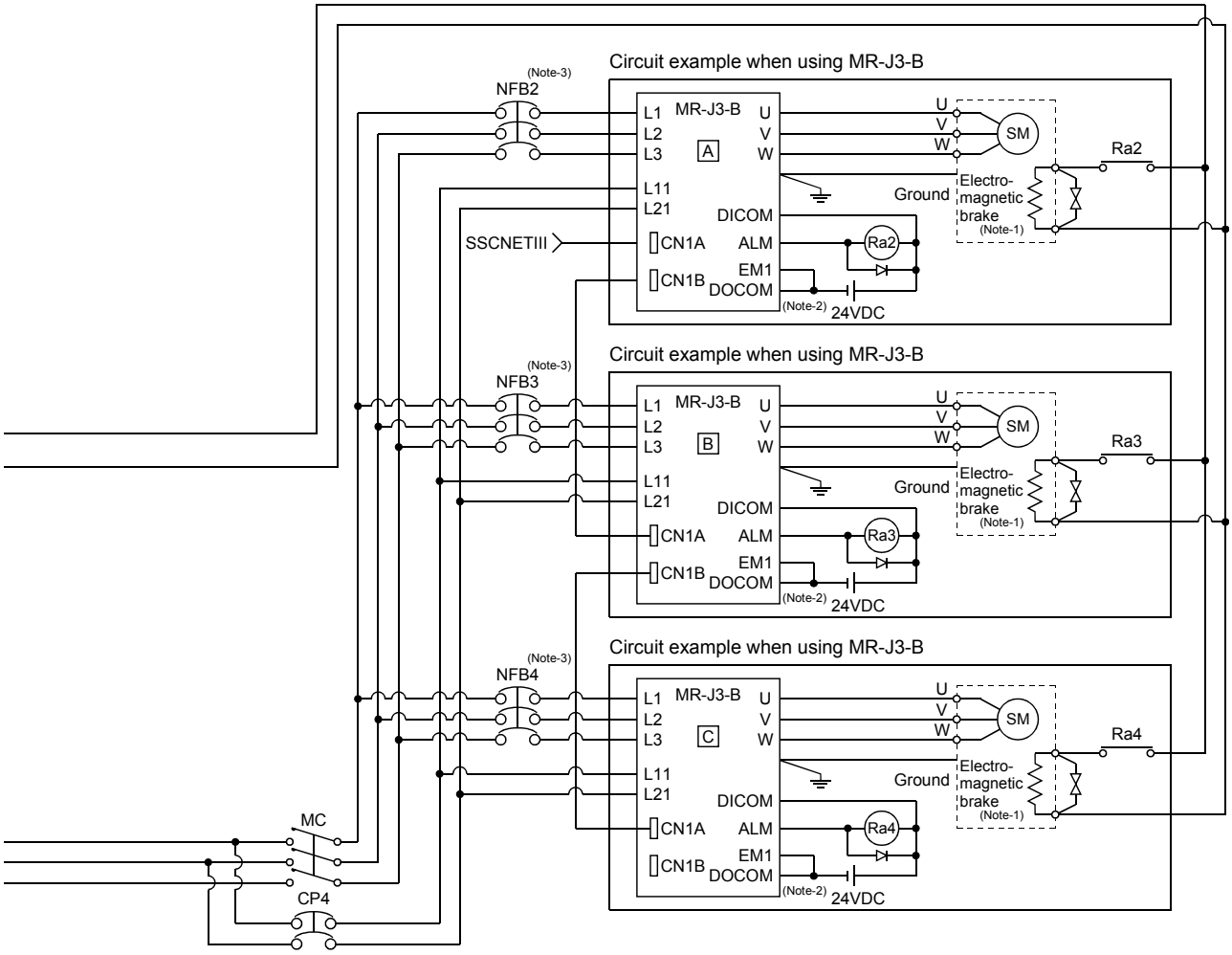
3.2 External Circuit Design

As to the ways to design the external circuits of the Motion system, this section explains the method and instructions for designing the power supply circuits and safety circuits, etc.
(1) Sample system circuit design for motion control



POINT

(1) (Note-1): It is also possible to use a full wave rectified power supply as the power supply for the electromagnetic brake.
(2) (Note-2): It is also possible to use forced stop signal of the servo amplifier.
(3) (Note-3): It is recommendeds to use one leakage breaker for one servo amplifier. When electric power is supplied to multiple servo amplifiers for one leakage breaker, select the wire connected to the servo amplifier according to the capacity of the leakage breaker.
(4) For SSCNET III cable of connection, refer to section 2.4.2



(Note-1): When the control power supply of the servo amplifier is shut off, it is not possible to communicate with the servo amplifier after that.
Example) When the control power supply L11/L21 of servo amplifier [B] in above figure is shut off, it is also not possible to communicate with servo amplifier [C] .
If only a specific servo amplifier power supply is shut off, be sure to shut off the main circuit power supply L1/L2/L3, and do not shut off the control power supply L11/L21.

(Note-2): Be sure to shut off the both of main circuit power supply L1/L2/L3 and control power supply L11/L21 at the time of exchange of servo amplifier. At this time, it is not possible to communicate between the servo amplifier and Motion board. Therefore, be sure to exchange the servo amplifier after stopping the operating of machine beforehand.

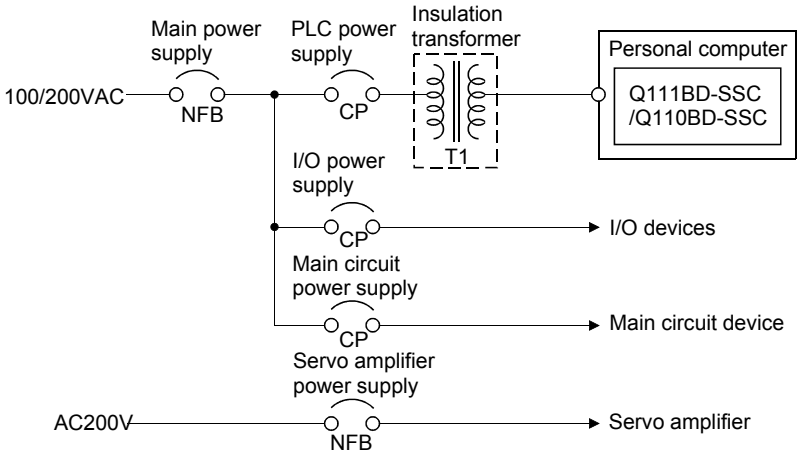
3.2.1 Power supply circuit design

This section describes the protective coordination and noise suppression techniques of the power supply circuit.

(1) Separation and protective coordination (leakage current protection, over current protection) of power supply lines

Separate the personal computer's power supply line from the lines for I/O devices and the servo amplifier as shown below.

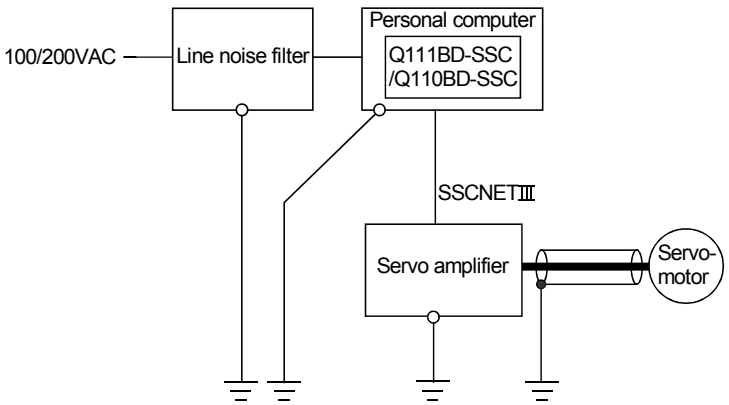
When there is much noise, connect an insulation transformer.



(2) Grounding

The Motion system may malfunction as it is affected by various noises such as electric path noises from the power supply lines, radiated and induced noises from other equipment, servo amplifiers and their cables, and electromagnetic noises from conductors. To avoid such troubles, connect the earth ground of each equipment and the shield grounds of the shielded cables to the earth.

For grounding, where possible, use the exclusive ground terminal wire of each equipment or a single-point earth method to avoid grounding by common wiring, since noises may sneak from other equipment due to common impedances.



(Note): Be sure to ground the line noise filter, Multiple CPU system, servo amplifier and servomotor. (Ground resistance : 100 Ω or less)

3.2.2 Safety circuit design

(1) Concept of safety circuits

When the Motion board is being powered off, proper outputs may not be provided temporarily due to the delays and rise times of the Motion board power supply and external I/O control power supplies (especially DC).

Also, abnormal operations may happen when the external power supply becomes faulty or the Motion board fails.

To avoid abnormal operations of the whole system, construct the necessary fail-safe circuits (emergency stop, protective and interlock circuits, etc.) for parts which may contribute to machine breakdown and/or accidents due to abnormal operations outside of the Motion board.

(2) Emergency stop

(a) The circuit should be constructed outside of the Motion board or servo amplifier. Shut off the power supply to the external servo amplifier by this circuit, and turn on the electromagnetic brakes of the servomotor.

(b) By using the emergency stop input, all axes of external servo amplifiers can be stopped simultaneously and immediately.
To recover from the emergency stop state, remove the source of the emergency stop.
(An emergency stop does not cause the servo error detection signals to turn on.)
To enable or disable the emergency stop input, change the basic settings in the system settings accordingly.

(3) Forced stop

(a) By using devices (M, X) assigned as external forced stop input, all axes of external servo amplifiers can be stopped simultaneously and immediately.
To recover from the external forced stop state, remove the source of the external forced stop.
(An external forced stop does not cause the servo error detection signals to turn on.)
Input numbers for external forced stop input can be assigned in the basic settings of the system settings.

(b) It is also possible to use the forced stop signal of the servo amplifier. Refer to the manual of the servo amplifier about servomotor capacity.

3.3 Installation environment

Before installing the Motion board, be sure that the board conforms with the specifications of the personal computer and the installation location satisfies the environmental conditions listed below.

(1) Ambient temperature is within the range of 0° to 55°C (32° to 131°F) .

(2) Ambient humidity is within the range of 10 to 90%RH.

(3) No condensing from sudden temperature changes

(4) No corrosive or inflammable gas

(5) There must not be a lot of conductible dust, iron filings, oil mist, or salt, organic solvents.

(6) No direct sunlight

(7) No strong electrical or magnetic fields

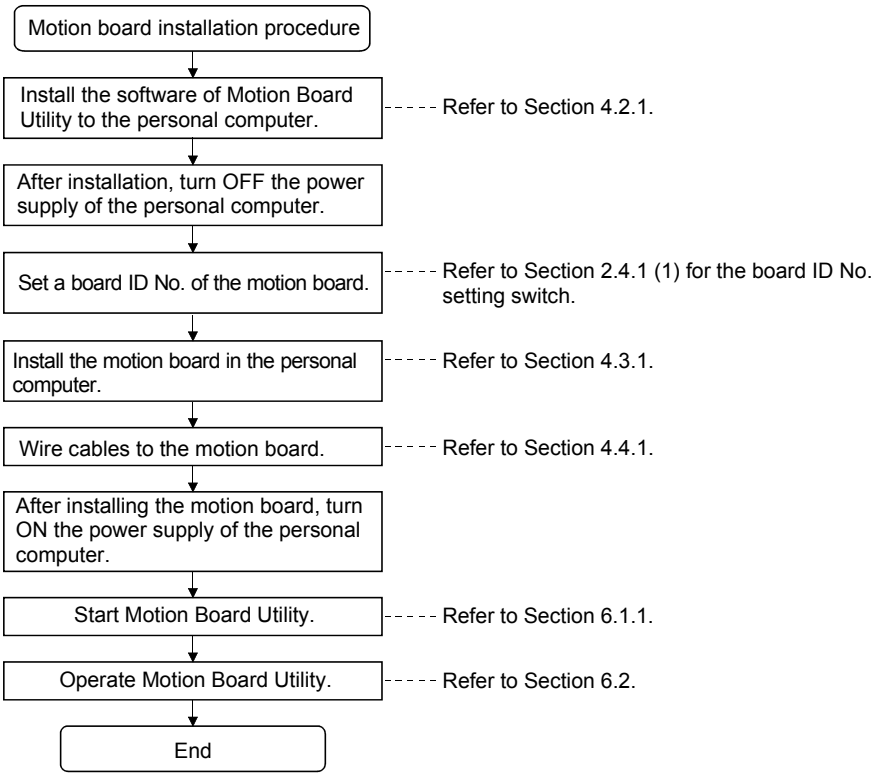
(8) No direct vibrations or shocks on the Motion controller

4. INSTALLATION AND WIRING

This chapter describes the procedure for installing a motion board to the personal computer and the method for wiring cables.

4.1 Procedure for installing Motion Board

This section explains the procedure for installing a motion board to the personal computer.


Motion board installation procedure
Install the software of Motion Board Utility to the personal computer.
Refer to Section 4.2.1.
After installation, turn OFF the power supply of the personal computer.
Set a board ID No. of the motion board.
Refer to Section 2.4.1 (1) for the board ID No. setting switch.
Install the motion board in the personal computer.
Refer to Section 4.3.1.
Wire cables to the motion board.
Refer to Section 4.4.1.
After installing the motion board, turn ON the power supply of the personal computer.
Start Motion Board Utility.
Refer to Section 6.1.1.
Operate Motion Board Utility.
Refer to Section 6.2.
End

POINT

(1) Be sure to install the Motion Board Utility before installing the motion board to the personal computer.
Note, however, that this installation is not necessary if the target personal computer will not be used for the following purposes.
- Using Motion Board Utility, accessing the Motion board for STOP/RUN, RESET, L.CLR, etc., and checking operation status and information of the Motion board.
- Using Motion Board Utility, performing Ethernet communication, transfering user applications, etc. (Refer to Section 6.2 in Chapter 6.)
- Performing program transfer, monitoring or debugging from the personal computer on which the Motion board is mounted.
- Using the personal computer monitoring function.

(2) When communicating with the motion board, start SW6RN-SNETP-E0011.
If communication is performed by SW6RN-GSVE-E0011 while SW6RN-SNETP is being activated, a communication error (error code: -255) will occur.
End SW6RN-SNETP and then start SW6RN-SNETP-E0011.

4.2 Installation and Uninstallation of Motion Board Utility

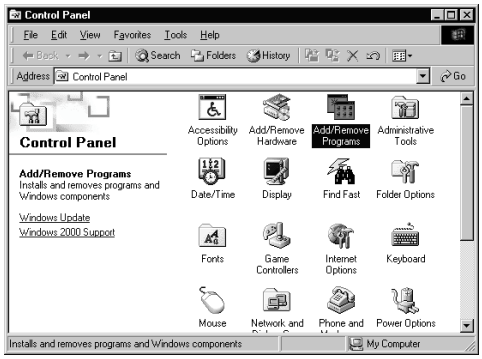
The following sections describe the installation and uninstallation methods of the Motion Board Utility.

4.2.1 Installation and Uninstallation of Motion Board Utility

This section describes the installation method of the Motion Board Utility.

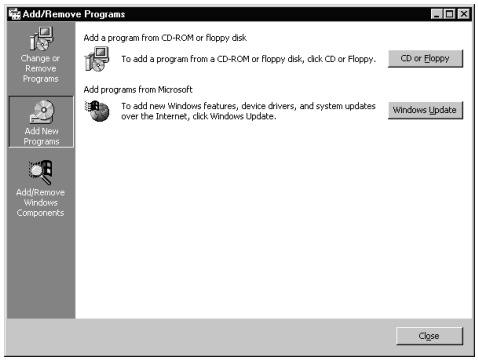
POINT

(1) Before installation, close all the other applications operated on Windows ®.
(2) In the following cases, be sure to uninstall (refer to Section 4.2.2.) and install it again.
- When the installation failed
- When installing again



↓

1) Turn ON the power supply of the personal computer and start Windows.
2) Select [start]-[Settings]-[Control Panel] to open "Control Panel".
Select "Add or Remove Programs" and double-click it.


Add/Remove Programs
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Add a program from CD-ROM or floppy disk
To add a program from a CD-ROM or floppy disk, click CD or Floppy.
CD or Floppy
Add programs from Microsoft
To add new Windows features, device drivers, and system updates over the Internet, click Windows Update.
Windows Update
Close

↓

3) Open "Add or Remove Programs" and select "Add New Programs".
Click the CD or Floppy button.

Install Program From Floppy Disk or CD-ROM
Insert the product's first installation floppy disk or CD-ROM, and then click Next.
< Back
Next >
Cancel

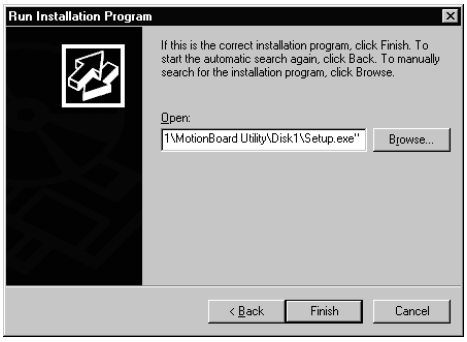
↓

4) Insert the CD-ROM disk (SW6RNC-GSVE-E0011) into the CD-ROM drive, and click the Next> button.

To next page

From preceding page

↓

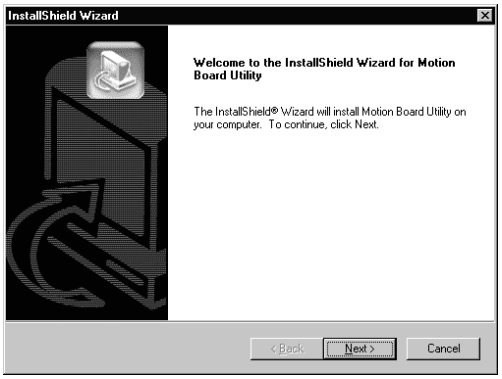

Run Installation Program
If this is the correct installation program, click Finish. To start the automatic search again, click Back. To manually search for the installation program, click Browse.
Open:
1\MotionBoard Utility\Disk1\Setup.exe"
Browse...
< Back
Finish
Cancel

5) When the screen on the left appears, click the Browse button and select the place where "Setup.exe" of the Motion Board Utility exists.
"Setup.exe" exists in the following folder of the CD-ROM (SW6RNC-GSVE-E0011).
- E:\SW6RN-GSVE-E0011\Motion Board Utility\Disk1\Setup.exe

*: __ part differs depending on the setting of a CD-ROM drive.

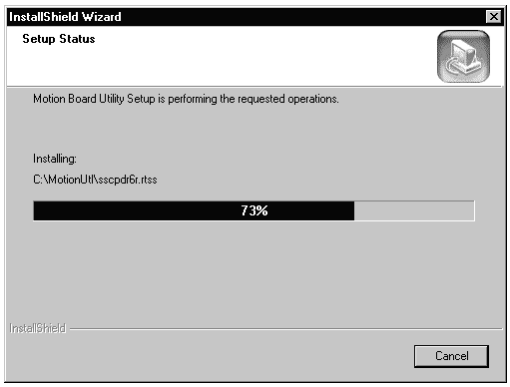
6) Click the Finish button.

↓


InstallShield Wizard
Welcome to the InstallShield Wizard for Motion Board Utility
The InstallShield® Wizard will install Motion Board Utility on your computer. To continue, click Next.
< Back
Next >
Cancel

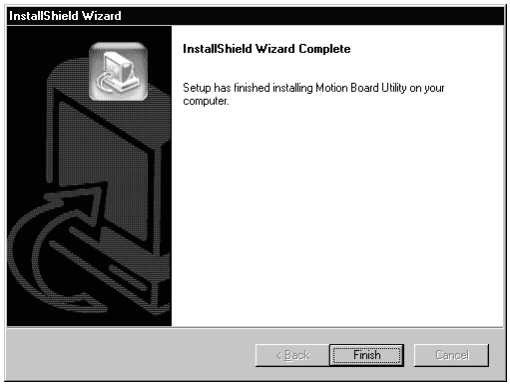
7) When the screen on the left appears, click the Next> button.

↓



8) The installation starts.
The Motion Board Utility is installed in the following folder.
・C:\MotionUtl

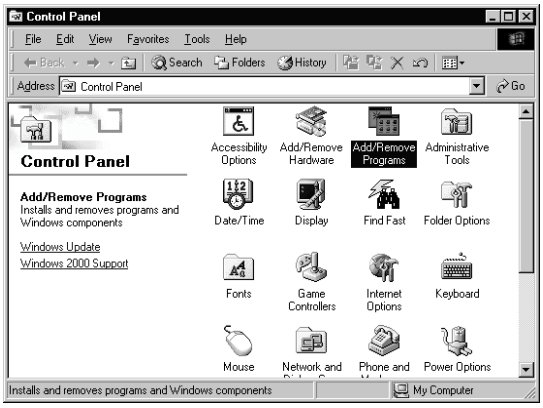
↓



9) When the installation is completed, the screen on the left appears.
Click the Finish button to end the installation.

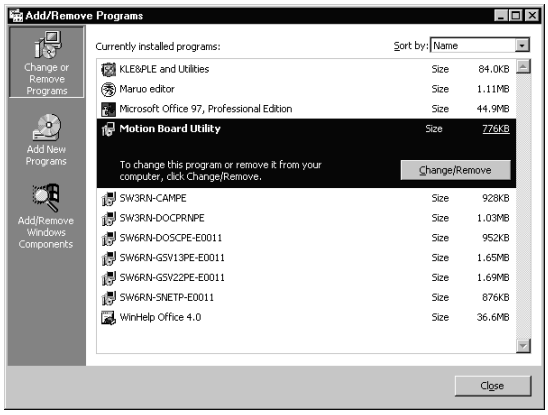
4.2.2 Uninstallation of Motion Board Utility

This section describes the uninstallation method of Motion Board Utility.



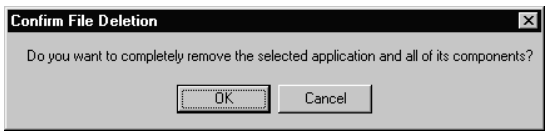
1) Select [Start]-[Settings]-[Control Panel] and open "Control Panel".
Select "Add or Remove Programs" and double-click it.

↓



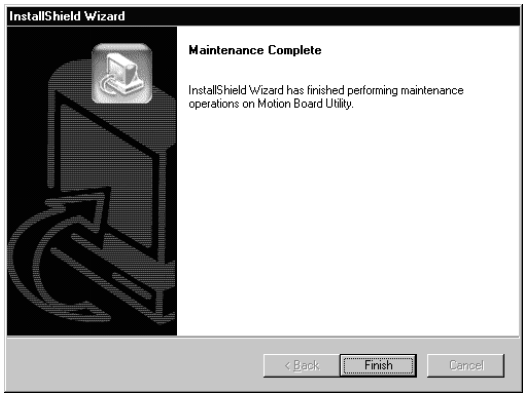
2) Open "Add or Remove Programs" and select "Add or Remove Programs.
Select Motion Board Utility and click the Change/Remove button.

↓



3) When the screen on the left appears, click the OK button to start the uninstallation.

↓



4) When the uninstallation is completed, the screen on the left appears.
Click the Finish button to end the uninstallation.

4.2.3 Instructions when the Motion board is installed without Motion Board Utility installed

If a personal computer in which the Motion board is installed without the Motion Board Utility also installed is booted, Windows shows a wizard dialog that prompts to install a driver of newly connected hardware.
Click the "Cancel" button, or click the "Next>" button and follow the steps below.

(1) When Windows2000 is used

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

1) If a personal computer on which the Motion board is mounted but Motion Board Utility is not installed is booted, the screen on the left appears.
Click the Next> or Cancel button.

↓

Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
PCI Device
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

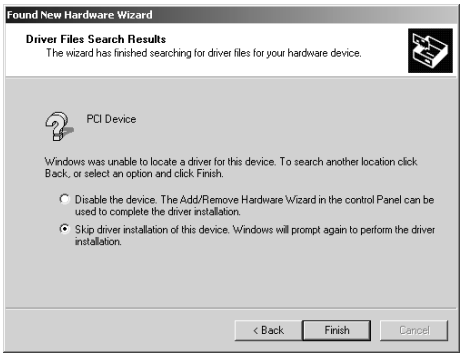
2) The screen on the left appears.
Click the Next> button.

↓

Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
PCI Device
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

3) The screen on the left appears.
Click the Next> button.

↓


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
PCI Device
Windows was unable to locate a driver for this device. To search another location click Back, or select an option and click Finish.
Disable the device. The Add/Remove Hardware Wizard in the control Panel can be used to complete the driver installation.
Skip driver installation of this device. Windows will prompt again to perform the driver installation.
< Back
Finish
Cancel

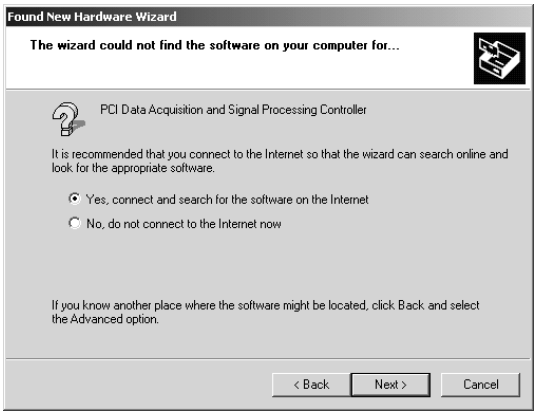
4) Select "Skip driver installation of this device. Windows will prompt again to perform the driver installation. "
and click the Finish button.

(2) When Windows XP is used

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
PCI Data Acquisition and Signal Processing Controller
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

1) If a personal computer on which the Motion board is mounted but Motion Board Utility is not installed is booted, the screen on the left appears.
Select “Install the software automatically. [Recommended]” and click the Next> button.

↓


Found New Hardware Wizard
The wizard could not find the software on your computer for...
PCI Data Acquisition and Signal Processing Controller
It is recommended that you connect to the Internet so that the wizard can search online and look for the appropriate software.
Yes, connect and search for the software on the Internet
No, do not connect to the Internet now
If you know another place where the software might be located, click Back and select the Advanced option.
< Back
Next >
Cancel

2) The screen on the left appears.
Click the Next> button.

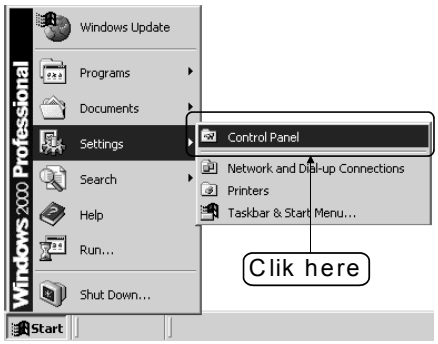
↓

Found New Hardware Wizard
Cannot Install this Hardware
The hardware was not installed because the wizard cannot find the necessary software.
Click Back if you have installation media such as a CD-ROM, or if you know the location of the software.
Don't prompt me again to install this software.
< Back
Finish
Cancel

3) Uncheck “Don't prompt me again to install this software.” and click the Finish button.

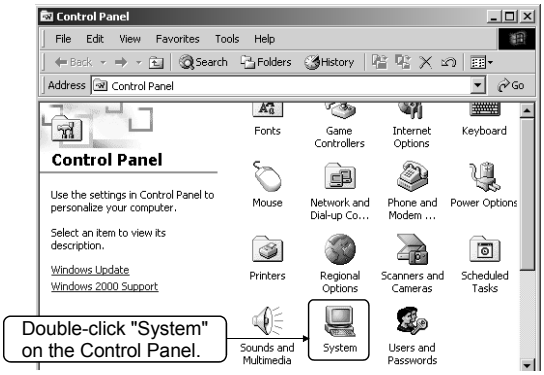
After the above steps are all completed, install Motion Board Utility and then reboot the personal computer.
If the “Finish” button is clicked without completing the steps above, the wizard dialog for a newly connected hardware will not appear after rebooting the personal computer.
In such a case, click “Reinstall Driver” in Device Manager.

Follow the steps below to install the driver again.
(1) When Windows2000 is used



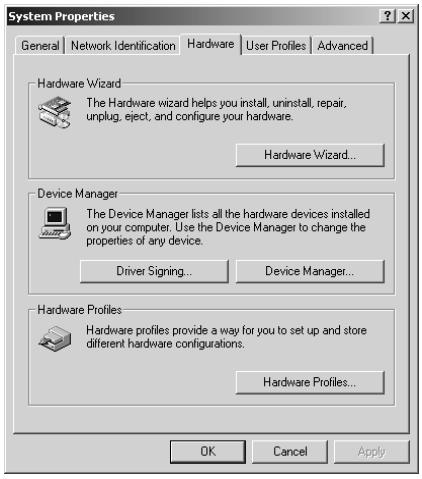
1) Select [Start]-[Settings]-[Control Panel] and open “Control Panel".

↓



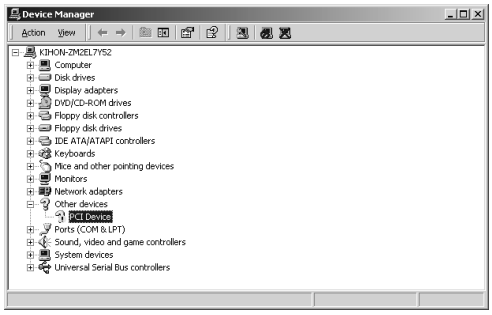
2) Select "System” and double-click it.

↓


System Properties
General
Network Identification
Hardware
User Profiles
Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

3) In the property screen, select “Hardware” tab and click Device Manager.

↓



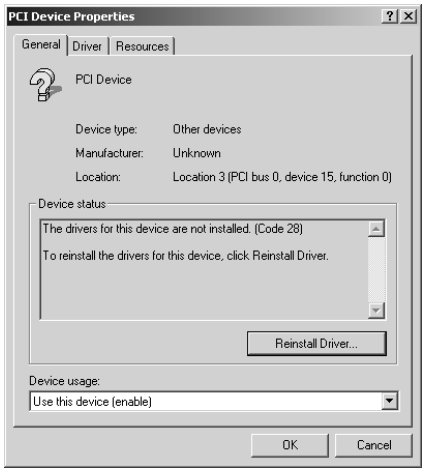
4) The device manager screen appears. Select “PCI Device”.
5) Right-click “PCI Device” and refer to the property.

↓

To next page

From preceding page

↓



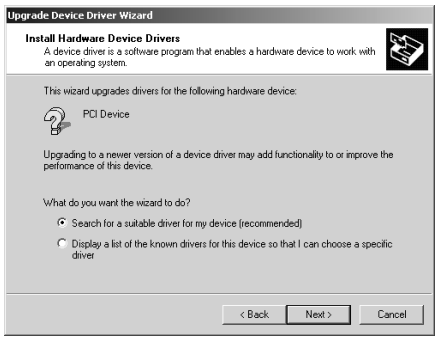
6) Click the [Reinstall Driver] button.
7) Click the [OK] button

↓

Upgrade Device Driver Wizard
Welcome to the Upgrade Device Driver Wizard
This wizard helps you upgrade a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

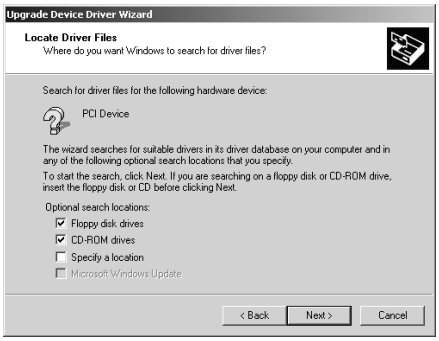
8) The screen on the left appears. Click the [Next>] button.

↓


Upgrade Device Driver Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard upgrades drivers for the following hardware device:
PCI Device
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

9) The screen on the left appears. Click the [Next>] button.

↓


Upgrade Device Driver Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
PCI Device
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

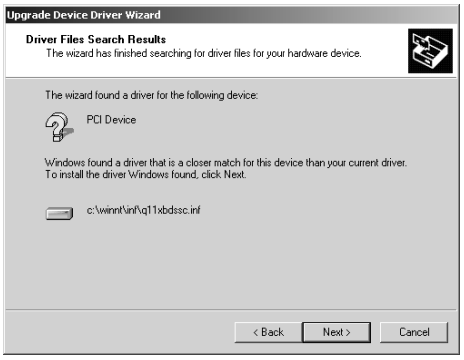
10) The screen on the left appears. Click the [Next>] button.

↓

To next page

From preceding page

↓


Upgrade Device Driver Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
PCI Device
Windows found a driver that is a closer match for this device than your current driver.
To install the driver Windows found, click Next.
c:\winnt\inf\q11xbdssc.inf
< Back
Next >
Cancel

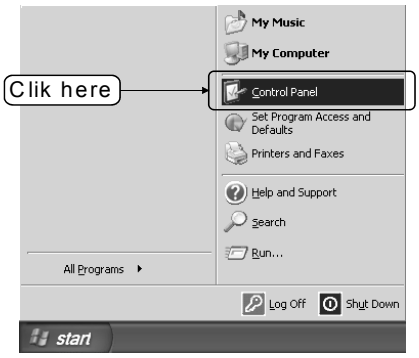
11) The screen on the left appears. Click the Next> button.

↓

Upgrade Device Driver Wizard
Completing the Upgrade Device Driver Wizard
SSCNET PCI Board (Q11XBD-SSC)
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

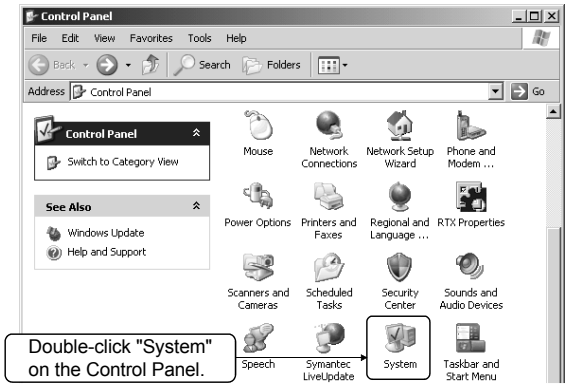
12) The screen on the left appears. Click the Finish button to completes installation of the driver.

(1) When Windows XP is used



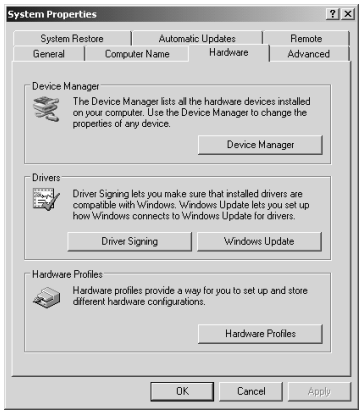
1) Select [Start]-[Control Panel] and open “Control Panel".

↓



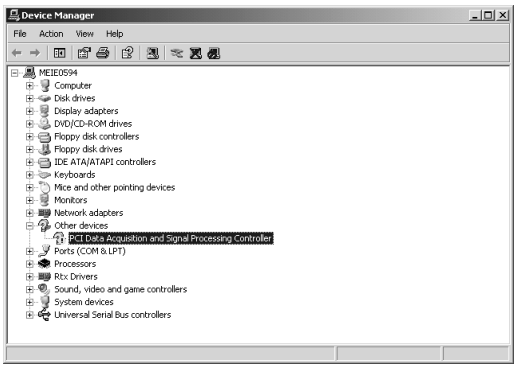
2) Select "System” and double-click it.

↓


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

3) In the property screen, select “Hardware” tab and click Device Manager.

↓



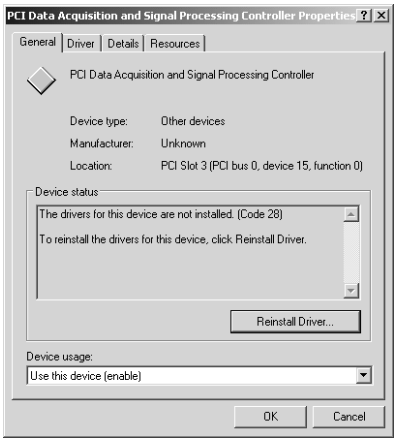
4) The device manager screen appears. Select “PCI Device”.
5) Right-click “PCI Device” and refer to the property.

↓

To next page

From preceding page

↓



6) Click the [Reinstall Device] button.

7) Click the [OK] button

↓

Hardware Update Wizard
Welcome to the Hardware Update Wizard
This wizard helps you install software for:
PCI Data Acquisition and Signal Processing Controller
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

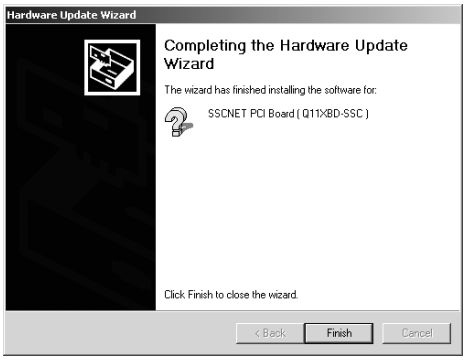
8) The screen on the left appears. Click the [Next>] button.

↓

Hardware Installation
The software you are installing for this hardware:
SSCNET PCI Board (Q11XBD-SSC)
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

9) The screen on the left appears. Click the [Continue Anyway] button.

↓


Hardware Update Wizard
Completing the Hardware Update Wizard
The wizard has finished installing the software for:
SSCNET PCI Board (Q11XBD-SSC)
Click Finish to close the wizard.
< Back
Finish
Cancel

10) When the screen on the left appears, click the [Finish] button to end the installation of driver.

4.3 Motion board Installation

4.3.1 Instructions for handling

⚠ CAUTION
• Use the Motion board in an environment that meets the general specifications contained in this manual. Using this Motion board in an environment outside the range of the general specifications could result in electric shock, fire, operation failure, and damage to or deterioration of the product. • Fix the motion board with the mounting screws securely, and be sure to tighten the mounting screws within the specified torque range. Under tightening may cause an operation failure. Over tightening may cause a short circuit or operation failure due to damage to the screws or motion board. • The motion board should be handled in a place without static electricity. Not doing so could result in a malfunction or operation failure. • Before connecting or disconnecting the Motion board to or from a personal computer, be sure to disconnect external cables (emergency stop circuit/watch dog timer output circuit/SSCNET III cables) and power off the personal computer. Not doing so could result in an electric shock or damage to the product. • Do not directly touch the Motion board conductive parts. Touching the conductive parts could cause an operation failure or damage the Motion board.

This section describes instructions for handling the Motion board.

(1) Do not drop or strongly impact the Motion board.

(2) For the tightening torque of the motion board mounting screw, refer to the instruction manual of the personal computer.

4.3.2 Installation and removal of Motion board

For the procedure of installing and uninstalling the Motion board to and from the extended slot for the PCI bus of the personal computer, refer to the instruction manual of the personal computer.

4.4 Installation and Removal of Cable

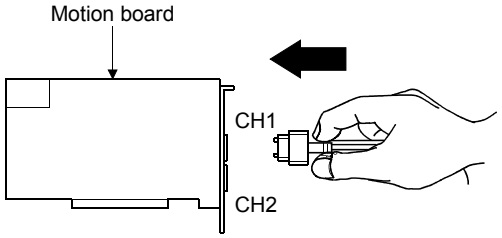
4.4.1 SSCNET III cable

(1) Precautions for handling the SSCNET III cable

- Do not stomp on the SSCNET III cable.
- When routing the SSCNET III cable, be sure to allow for the minimum cable bend radius or more.
  If less than the minimum cable bend radius is allowed, it may cause malfunctions due to characteristic deterioration, wire breakage, etc.

Model name of SSCNET III cable	Minimum Bend Radius [mm (inch)]
MR-J3BUS[ ]M	25 (0.98)
MR-J3BUS[ ]M-A	Enforced covering cord: 50 (1.97) Optical Cord : 25 (0.98)
MR-J3BUS[ ]M-B	Enforced covering cord: 50 (1.97) Optical Cord : 30 (1.18)

- Hold the connector tab securely when installing or removing the SSCNET III cable.



- For wiring precautions, refer to Section 4.5.2.

(2) Installation of the SSCNET III cable

- When installing the SSCNET III cable to the Motion board, hold the connector tab while inserting it into the SSCNET III connector CH1 or CH2 of the Motion board. Be sure to insert it until it clicks.

(3) Removal of the SSCNET III cable

- When removing the SSCNET III cable, hold SSCNET III cable connector or the connector tab.
- After removal of the SSCNET III cable, be sure to put a cap back on the Motion board and servo amplifier.

POINT

(1) Forcibly removing the SSCNET III cable from the Motion board module will damage the Motion board modules and SSCNET III cables.
(2) After removal of the SSCNET III cable, be sure to put a cap on the SSCNET III connector. Otherwise, adhesion of dirt may cause malfunctions.
(3) Do not remove the SSCNET III cable while turning on the power supply of Motion board and servo amplifier.
Do not look directly at the light generated from the end of SSCNET III cable. Direct eye contact with the light may damage the eye. (The light source of SSCNET III cable corresponds to class1 defined in JISC6802 or IEC60825-1.)
(4) If the SSCNET III cable is subjected to major shock, lateral pressure, tension, sudden bending or twisting, its inside may distort or brake and optical transmission will not be possible.
Be careful when twisting the short SSCNET III cable so that it is not damaged easily.
(5) Be sure to use the SSCNET III cable within the range of the operating temperature described in this manual. The cable/optical cord will melt if left near a fire or high temperature. Therefore, do not allow it to touch a part which may become hot, such as the radiator or regenerative brake option of the servo amplifier, or servomotor.
(6) When routing the SSCNET III cable, be sure to allow for the minimum cable bend radius or more.
(7) Put the SSCNET III cable in a duct or fix the cable at the closest part to the Motion board module with bundle material in order to prevent the SSCNET III cable from putting its own weight onto the SSCNET III connector.
(8) If routing the SSCNET III cable, do not allow the cable to touch wires or cables made from soft polyvinyl chloride (PVC), polyethylene resin (PE), teflon (Fluorocarbon resin) or nylon which contains plasticizing material. Never use vinyl tape for on the cord. Plasticizing material in vinyl tape gets into the optical fiber and lowers the optical characteristics. At worst, it may cause wire breakage. If using adhesive tape for cable laying, the fire resistant acetate cloth adhesive tape 570F (Teraoka Seisakusho Co., Ltd) is recommended.
(9) The adhesion of solvent and oil to the SSCNET III cable may lower the optical characteristics and machine characteristics. If it is used in such an environment, be sure to do the protection measures to the cord part.
(10) When storing the Motion board or servo amplifier, be sure to put on a cap to the connector part so that dirt does not adhere to the end of SSCNET III connector.
(11) The SSCNET III connector has a cap on it to protect the light device inside the connector from dust. For this reason, do not remove the cap until just before mounting the SSCNET III cable. Then, when removing the SSCNET III cable, make sure to put a cap on.
(12) Be sure to keep the cap and the tube that protects the optical cord end of the SSCNET III cable in a plastic bag with a zipper to prevent them from becoming dirty.
(13) When returning the servo amplifier or Motion board, make sure to put a cap on the SSCNET III connector. When asking for repair of servo amplifier or Motion board due to some troubles, also make sure to put a cap on the SSCNET III connector. When a cap is not put on the connector, the optical device may be damaged during transit. In this case, exchange and repair of the optical device is required.

4.5 Wiring

4.5.1 Instructions for wiring

⚠ DANGER
• Completely turn off all lines of the power supply externally before wiring. Not completely turning off all power could result in electric shock or damage to the product. • When turning on the power supply or operating the module after wiring, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

⚠ CAUTION
• When connecting wires to the Motion board, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage. • External connections should be crimped or pressure welded with the specified tools, or correctly soldered. Imperfect connections could result in short circuit, fire, or operation failure. • Tighten the terminal screws within the specified torque range. If the terminal screws are loose, it could result in short circuit, fire, or operation failure. Tightening the terminal screws too much may cause damage to the screws and/or the module, causing the module to drop, short circuit, or experience an operation failure. • Be sure there are no foreign matters such as sawdust or wiring debris inside the module. Such debris could cause fire, damage, or operation failure.

4.5.2 Precautions of SSCNET III cable wiring

The SSCNET III cable is made from optical fiber. If optical fiber is subjected to major shock, lateral pressure, tension, sudden bending or twisting, its inside may distort or break, and optical transmission will not be possible. Be sure to use optical fiber within the range of operating temperature described in this manual. Optical fiber melts down if being left near fire or high temperature. Therefore, do not allow it to touch a part which becomes hot, such as the radiator or regenerative brake option of the servo amplifier.
Read described item of this section carefully and handle it with caution.

(1) Minimum bend radius
When routing the SSCNET III cable, be sure to allow for the minimum cable bend radius or more.
If less than the minimum cable bend radius is allowed, it may cause malfunctions due to characteristic deterioration, wire breakage, etc.

Model name of SSCNET III cable	Minimum Bend Radius [mm (inch)]
MR-J3BUS[ ]M	25 (0.98)
MR-J3BUS[ ]M-A	Enforced covering cord: 50 (1.97) Optical Cord : 25 (0.98)
MR-J3BUS[ ]M-B	Enforced covering cord: 50 (1.97) Optical Cord : 30 (1.18)

(2) Tension
If tension is added to the SSCNET III cable, an increase of transmission loss will occur because of external force which concentrates on the fixing part of the SSCNET III cable or the connecting part of the SSCNET III connector. At worst, breakage of the SSCNET III cable or damage to the SSCNET III connector may occur.
For cable laying, handle without putting forced tension. (Refer to "APPENDIX1.1 SSCNET III cables" for the tension strength.

(3) Lateral pressure
If lateral pressure is added to the SSCNET III cable, the cable itself distorts, internal optical cord gets stressed, and then transmission loss increases. At worst, the breakage of optical cable may occur. As the same condition also occurs during cable laying, if the SSCNET III cable is fixed, do not tighten up optical cable with something such as a nylon band (TY-RAP).

(4) Twisting
If the SSCNET III cable is twisted, the same condition will occur as when local lateral pressure or bending is applied. Consequently, transmission loss increases, and the breakage of optical fiber may occur.

(5) Wiring process of SSCNET III cable
Put the SSCNET III cable in a duct or fix the cable to the closest part to the Motion board with bundle material in order to prevent the SSCNET III cable from putting its own weight on the SSCNET III connector.

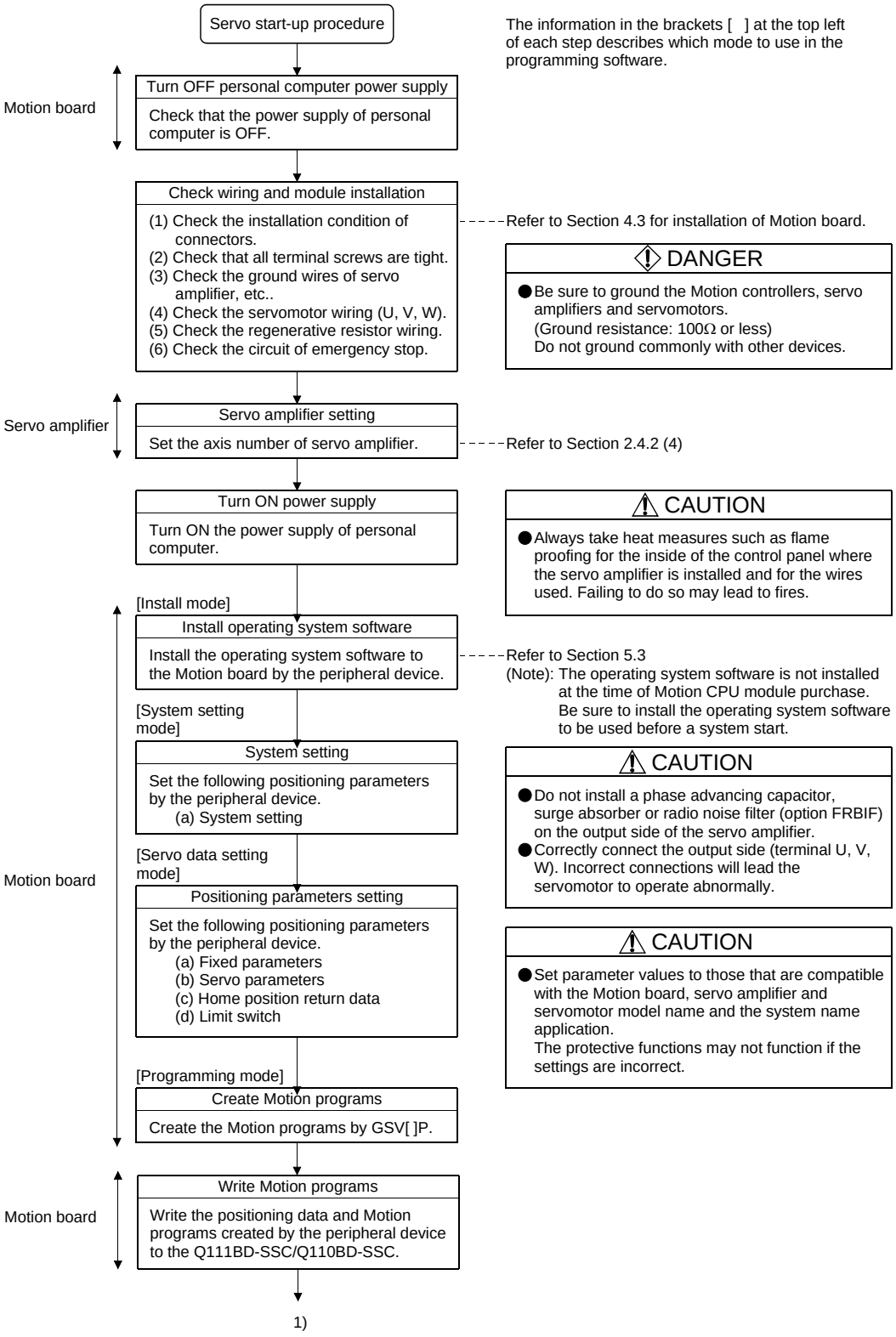
5. TRIAL OPERATION AND ADJUSTMENT

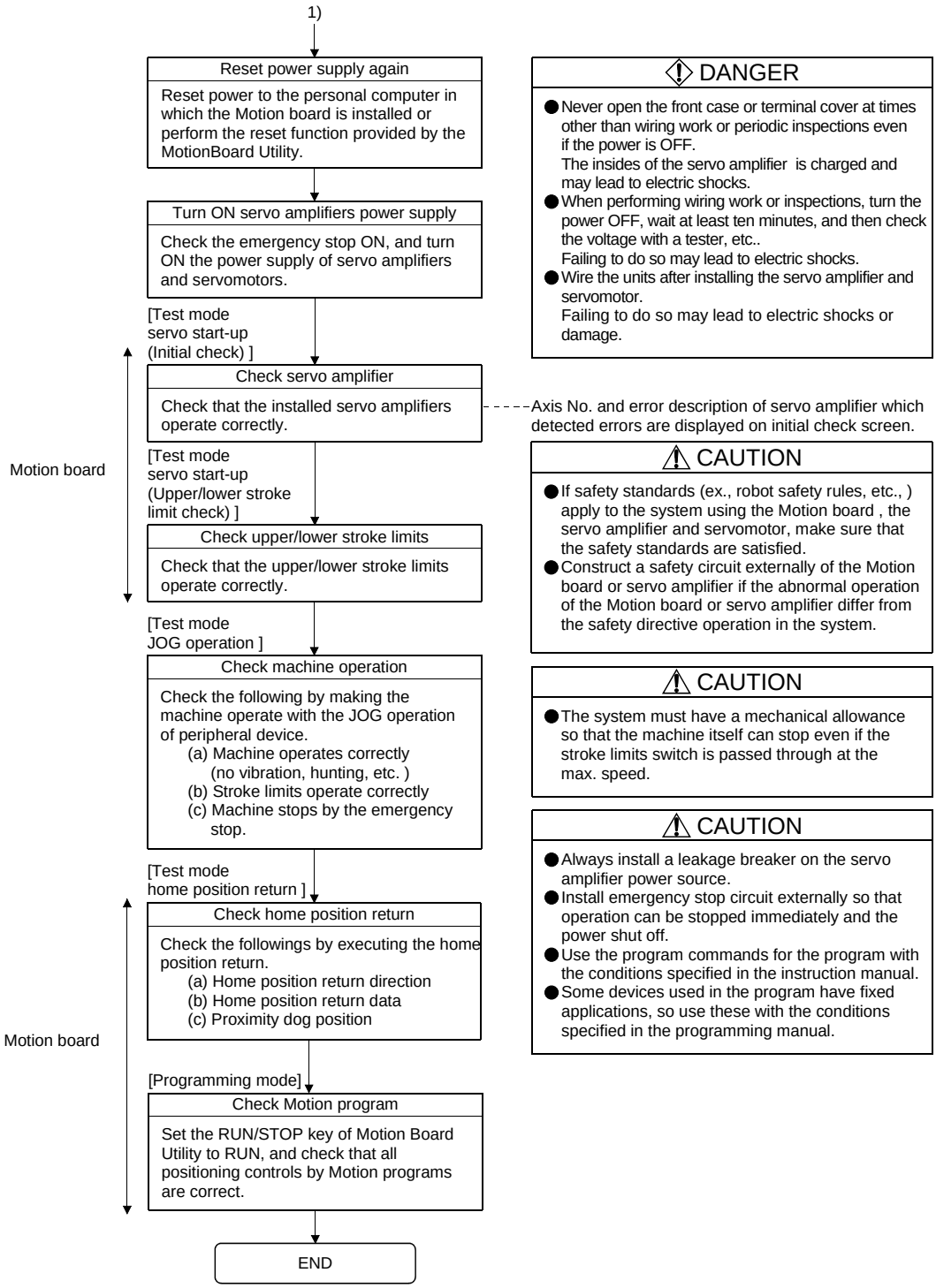
5.1 Checklist before Trial Operation

Table 5.1 Checklists before Trial Operation

Model Name	Confirmation Items	Reference
Q111BD-SSC/Q110BD-SSC Motion board	(1) Check that the motion board is installed in the personal computer correctly.	4.3.2
	(2) Check that the motion board is connected correctly if the emergency stop or watchdog timer output is used.	3.2
	(3) Check that the dip switch of the motion board is set correctly.	2.4.1 (1)
	(4) Check that the battery lead connector is connected into the BAT connector of battery holder unit correctly.	2.4.1 (4)
	(5) Check that the battery voltage is normal. (Normal value: 3.0V)	
SSCNET III cable	(1) Check that the installed SSCNET III cable model names are correct.	2.4.2
	(2) Check that the installation positions of the connector for SSCNET III cables are correct.	
	(3) Check that the SSCNET III cables are connected correctly.	4.4.1

5.2 Trial Operation and Adjustment Procedure


Servo start-up procedure
The information in the brackets [ ] at the top left of each step describes which mode to use in the programming software.
Motion board
Turn OFF personal computer power supply
Check that the power supply of personal computer is OFF.
Check wiring and module installation
(1) Check the installation condition of connectors.
(2) Check that all terminal screws are tight.
(3) Check the ground wires of servo amplifier, etc..
(4) Check the servomotor wiring (U, V, W).
(5) Check the regenerative resistor wiring.
(6) Check the circuit of emergency stop.
Refer to Section 4.3 for installation of Motion board.
DANGER
Be sure to ground the Motion controllers, servo amplifiers and servomotors.
(Ground resistance: 100Ω or less)
Do not ground commonly with other devices.
Servo amplifier
Servo amplifier setting
Set the axis number of servo amplifier.
Refer to Section 2.4.2 (4)
Turn ON power supply
Turn ON the power supply of personal computer.
CAUTION
Always take heat measures such as flame proofing for the inside of the control panel where the servo amplifier is installed and for the wires used. Failing to do so may lead to fires.
[Install mode]
Install operating system software
Install the operating system software to the Motion board by the peripheral device.
Refer to Section 5.3
(Note): The operating system software is not installed at the time of Motion CPU module purchase. Be sure to install the operating system software to be used before a system start.
[System setting mode]
System setting
Set the following positioning parameters by the peripheral device.
(a) System setting
CAUTION
Do not install a phase advancing capacitor, surge absorber or radio noise filter (option FRBIF) on the output side of the servo amplifier.
Correctly connect the output side (terminal U, V, W). Incorrect connections will lead the servomotor to operate abnormally.
Motion board
[Servo data setting mode]
Positioning parameters setting
Set the following positioning parameters by the peripheral device.
(a) Fixed parameters
(b) Servo parameters
(c) Home position return data
(d) Limit switch
CAUTION
Set parameter values to those that are compatible with the Motion board, servo amplifier and servomotor model name and the system name application.
The protective functions may not function if the settings are incorrect.
[Programming mode]
Create Motion programs
Create the Motion programs by GSV[ ]P.
Motion board
Write Motion programs
Write the positioning data and Motion programs created by the peripheral device to the Q111BD-SSC/Q110BD-SSC.
1)

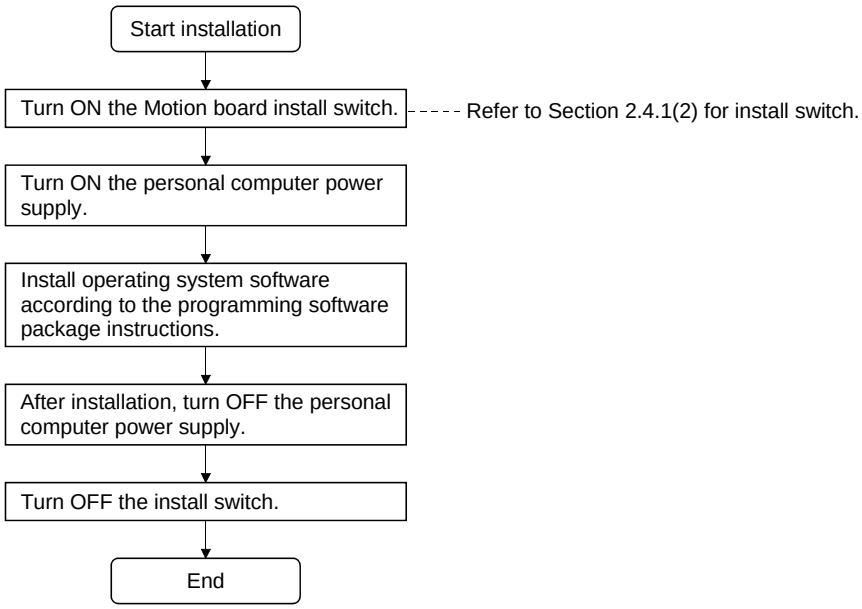

1)
Reset power supply again
Reset power to the personal computer in which the Motion board is installed or perform the reset function provided by the MotionBoard Utility.
Turn ON servo amplifiers power supply
Check the emergency stop ON, and turn ON the power supply of servo amplifiers and servomotors.
[Test mode servo start-up (Initial check)]
Check servo amplifier
Check that the installed servo amplifiers operate correctly.
Axis No. and error description of servo amplifier which detected errors are displayed on initial check screen.
Motion board
[Test mode servo start-up (Upper/lower stroke limit check)]
Check upper/lower stroke limits
Check that the upper/lower stroke limits operate correctly.
[Test mode JOG operation]
Check machine operation
Check the following by making the machine operate with the JOG operation of peripheral device.
(a) Machine operates correctly (no vibration, hunting, etc.)
(b) Stroke limits operate correctly
(c) Machine stops by the emergency stop.
[Test mode home position return]
Check home position return
Check the followings by executing the home position return.
(a) Home position return direction
(b) Home position return data
(c) Proximity dog position
Motion board
[Programming mode]
Check Motion program
Set the RUN/STOP key of Motion Board Utility to RUN, and check that all positioning controls by Motion programs are correct.
END
DANGER
● Never open the front case or terminal cover at times other than wiring work or periodic inspections even if the power is OFF.
The insides of the servo amplifier is charged and may lead to electric shocks.
● When performing wiring work or inspections, turn the power OFF, wait at least ten minutes, and then check the voltage with a tester, etc..
Failing to do so may lead to electric shocks.
● Wire the units after installing the servo amplifier and servomotor.
Failing to do so may lead to electric shocks or damage.
CAUTION
● If safety standards (ex., robot safety rules, etc.,) apply to the system using the Motion board , the servo amplifier and servomotor, make sure that the safety standards are satisfied.
● Construct a safety circuit externally of the Motion board or servo amplifier if the abnormal operation of the Motion board or servo amplifier differ from the safety directive operation in the system.
CAUTION
● The system must have a mechanical allowance so that the machine itself can stop even if the stroke limits switch is passed through at the max. speed.
CAUTION
● Always install a leakage breaker on the servo amplifier power source.
● Install emergency stop circuit externally so that operation can be stopped immediately and the power shut off.
● Use the program commands for the program with the conditions specified in the instruction manual.
● Some devices used in the program have fixed applications, so use these with the conditions specified in the programming manual.

POINT

(1) Make note of motor module names before the motor is installed on a machine.
The motor name plate may not be visible after the motor is installed.
(2) When the servo amplifier, servomotor is first turned on, check the operation before the servomotor is installed on a machine to avoid unexpected accidents such as machine breakage.

5.3 Operating System Software Installation Procedure

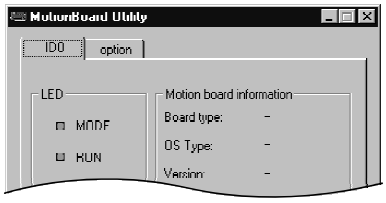
The operating system software must be installed to the Motion board module by using the peripheral device and programming software package.


Start installation
Turn ON the Motion board install switch.
Refer to Section 2.4.1(2) for install switch.
Turn ON the personal computer power supply.
Install operating system software according to the programming software package instructions.
After installation, turn OFF the personal computer power supply.
Turn OFF the install switch.
End

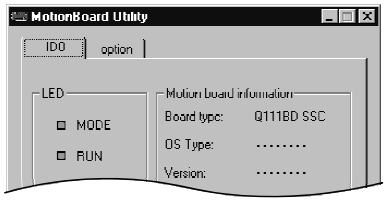
POINT

(1) If the operating system software was not installed at the time of Motion board module purchase, be sure to install the operating system software to be used before a system start.
To check that the operating system software is installed, refer to board information provided in Motion Board Utility.
If the operating system software is not installed, the utility screen shows as follows: (Refer to Chapter 6 for details.)

[If not installed]



[If installed]



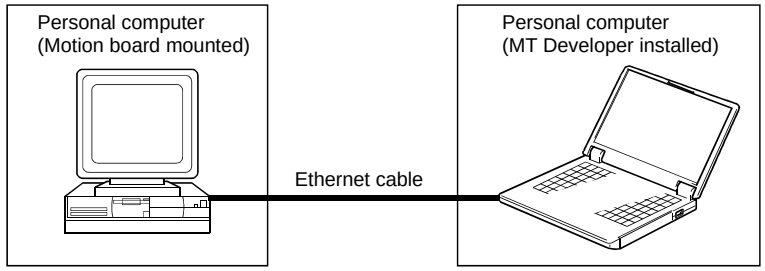
(2) Even if the operating system software is installed, the positioning data and servo programs already written in the Motion board module do not need to be rewritten.
(3) Do not turn off the power supply during installation. The Motion board module may break down.

6. MOTION BOARD UTILITY

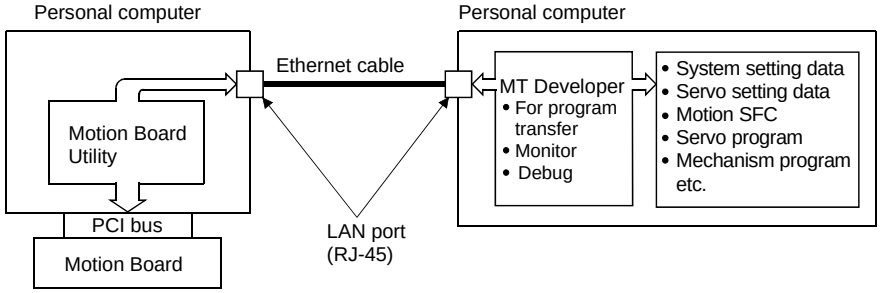
The Motion Board Utility is utility software featuring two functions available for use with the Motion board (Q111BD-SSC/Q110BD-SSC). One of them is the monitoring function for operating status or information of the board, and the other is the operating function for STOP/RUN, RESET, L.CLR using the screen switches.
Also, the Motion Board Utility allows its host computer to be connected to another computer on which MT Developer is installed through Ethernet, by which programs can be transferred, monitored and debugged from the MT Developer-installed computer.
(For details on the operating procedure, refer to Help of Motion Board Utility.)

Ethernet communication function

[System configuration diagram]



[Conection diagram]



* : Assign IP addresses to computers before using the Ethernet communication function.
(For details on the operating procedure, refer to Help of MotionBoard Utility.)

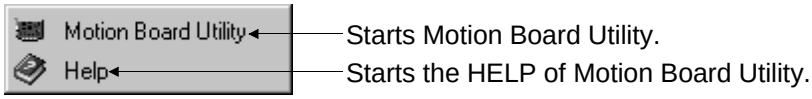
Note that user applications (servo setting data, Motion SFC and servo program) can also be written, read and verified without MT Developer.
(For details on the operating procedure, refer to Help of Motion Board Utility.)

6 MOTION BOARD UTILITY

6.1 Start and Exit of Motion Board Utility

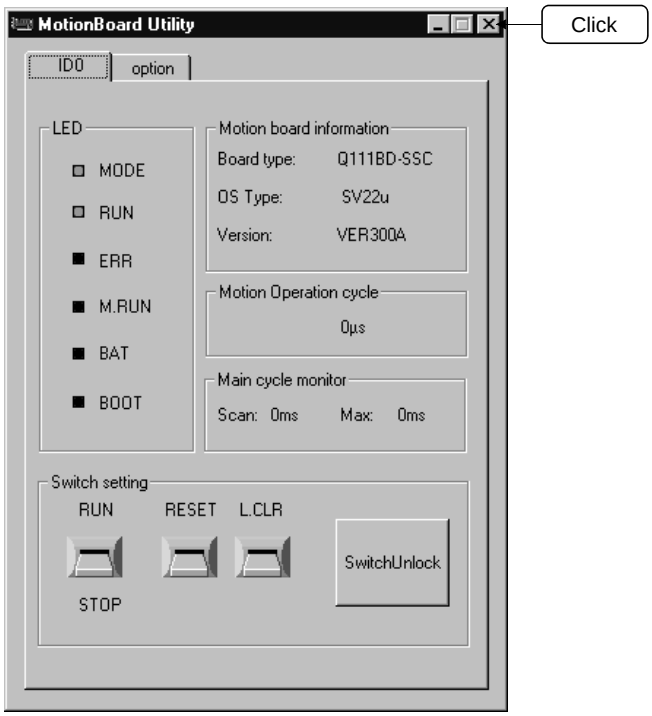
6.1.1 Start of Motion Board Utility

The Motion Board Utility can be started by clicking the following menu in the [start]-[Programs]-[MELSOFT application]-[MT Developer]-[SW6RNC-GSVE-E0011] menu.
MELSOFT application



6.1.2 Exit of Motion Board Utility

To exit Motion Board Utility, click the [×] button on the upper right corner of the title bar on the Motion Board Utility screen.



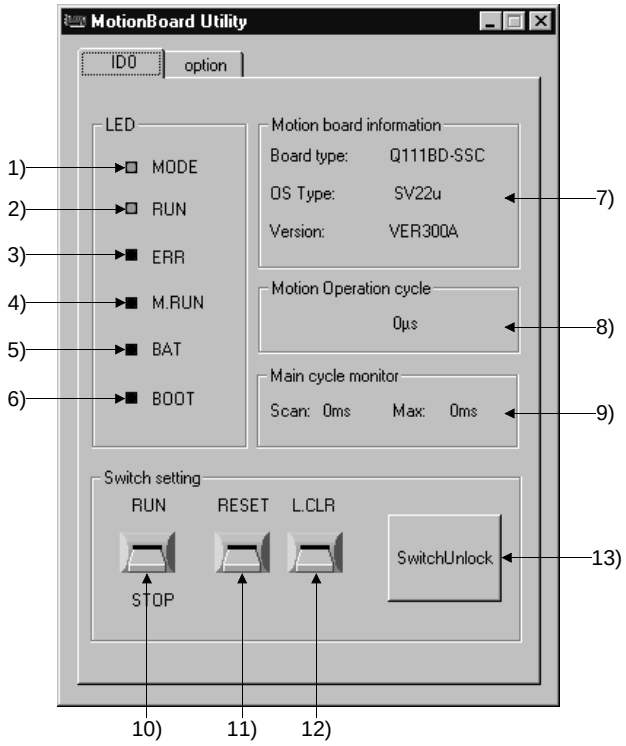
6.2 Operation of Motion Board Utility

This section describes the operation of the Motion Board Utility.

(1) Board ID No. switching tab (ID0 to ID3)

This tab is used to perform motion board monitoring, STOP/RUN, RESET and latch clear operations.

The ID No. switching tabs (ID0 to ID3) for the number of mounted motion boards (Max. 4 boards) are displayed.

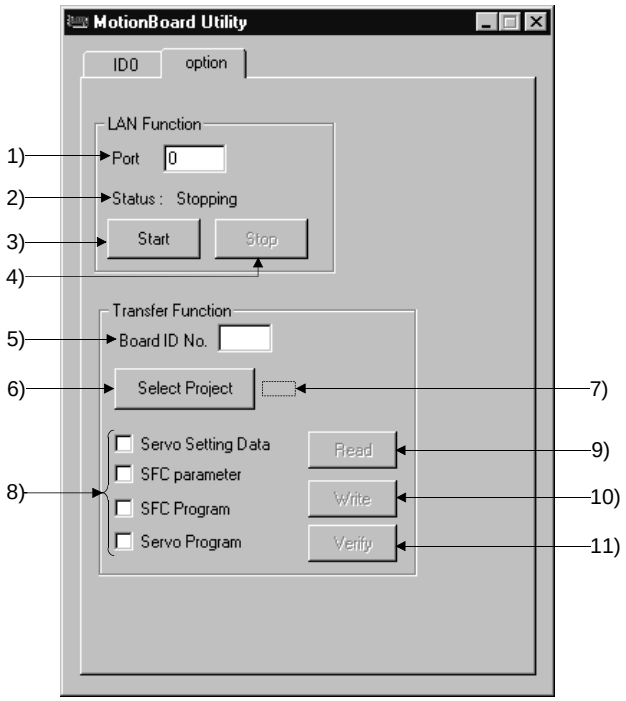


No.	Name	Application
1)	MODE LED	• Lit (green) : Normal mode • Lit (orange) : Installation mode/mode written in ROM
2)	RUN LED	• Lit : Motion board normal start • Not lit : LED turns off at following error occurrence. 1) Motion board start error 2) WDT error
3)	ERR. LED	• Lit : LED turns on at following error occurrence. 1) WDT error 2) System setting error 3) Servo error 4) Personal computer monitoring error • Not lit : Normal
4)	M.RUN LED	• Lit : During motion control • Flickers : Latch clear start • Not lit : Not during motion control.
5)	BAT. LED	• Lit : Battery error occurrence
6)	BOOT LED	• Lit : Mode operated by ROM • Not lit : Mode operated by RAM/Installation mode . mode written in ROM
7)	Motion board information	Displays the motion board type and the name and version information of installed OS model.
8)	Motion operation cycle	The time taken for the motion operation is indicated in [μs] unit.
9)	Main cycle monitor	The information of main cycle (cycle of processing carried out during the spare time when the motion control is not performed) is displayed. • Scan : The current main cycle is displayed in 1[ms] unit. • Max : The maximum value of main cycle is displayed in 1[ms] unit.

No.	Name	Application
10)	RUN/STOP (Momentary switch)	Move to RUN/STOP. • RUN : Turns ON the PLC ready flag. • STOP : Turns OFF the PLC ready flag.
11)	RESET (Momentary switch)	• RESET : Set the switch to the “RESET" position for two seconds or more to reset the hardware. Applies a reset after an operation error and initializs the operation.
12)	L.CLR (Momentary switch)	• L.CLR : All data in the latch area is cleared . (LATCH CLEAR also clears data outside the latch area at this time.) Latch clear operating method 1) Set the "RUN/STOP" switch to "STOP". 2) Turn on the "L.CLR" switch for 2 seconds or more. ("M. RUN LED" flickers: Latch clear performed.)
13)	Switch lock button	Switch lock button enables locking the operation of “RUN/STOP switch” and “RESET/L.CLR switch”. Selecting the lock switch button again unlocks the operation.

(2) Option tab

This tab is used to perform the operations for setting the LAN communication which operates the motion board via LAN and for transferring (writing, reading or verifying) data or programs to the motion board.



No.	Name	Application
1)	Port No.	Setting of the Port No. to be used in the LAN communication. • Setting range : 0 to 65536
2)	LAN connecting condition	The connecting condition of the LAN communication is displayed. • Stopped : The LAN communication is stopped • Disconnected : The LAN communication is started and in stand-by for the communication on the target side • Connected : The LAN connection is connected.
3)	Start button	The LAN communication is started by the Start button.
4)	Stop button	The LAN communication is stopped by the Stop button.
5)	Board ID No.	Setting of the board ID No. of the transfer target motion board. Input the ID No. setting using the setting switch of the motion board. (Refer to Section 3.2.1.)
6)	Select Project button	Data or a program project to be transferred is specified using the Select Project button. *: Specify the PC type file (GSVP.cnf) in the project.
7)	Project display	The project specified in 6) is displayed.
8)	Transfer data selection check box	Data or a program to be transferred is selected.
9)	Read button	Data or a program designated from the motion board is read using the Read button.
10)	Write button	Data or a program designated from the motion board is written using the Write button.
11)	Verify button	Data or a program in the motion board and project is verified using the Verify button.

MEMO

7. POSITIONING DEDICATED SIGNALS

The internal signals of the motion board are used as positioning signals.
The following five devices of the motion board are used as the internal signals of the motion board.

- Internal relay (M) ・・・・・・・・・・・・・・・ M2000 to M5599 (3600 points)
- Special relay (SP.M) ・・・・・・・・・・・・ M9073 to M9079 (7 points)
- Data register (D)・・・・・・・・・・・・・・・・ D0 to D1599 (1600 points)
- Motion register (#) ・・・・・・・・・・・・・・ #8000 to #8191 (192 points)
- Special register (SP.D) ・・・・・・・・・・・ D9112 and D9180 to D9201 (23 points)

7.1 Internal Relays

(1) Internal relay list

Device No.	Purpose	Real	Virtual
M0	User device (2000 points)		
M2000	Common device (320 points)	○	○
M2320	Unusable (80 points)	—	—
M2400	Axis status (20 points × 32 axes) Real mode ・・・・・・・ Each axis Virtual mode・・・・・・ Output module	○	○
M3040	Unusable (176 points)	—	—
M3200	Axis command signal (20 points × 32 axes) Real mode ・・・・・・・ Each axis Virtual mode・・・・・・ Output module	○	○
M3840	Unusable (60 points)	—	—
M4000	Virtual servomotor axis status (20 points × 32 axes) (Note-2)	Backup	○
M4640	Unusable (160 points)	—	—
M4800(Note-1)	Virtual servomotor axis command signal (20 points × 32 axes) (Note-2)	×	○
M5440(Note-1)	Unusable (48 points)	—	—
M5488(Note-1)	Cam axis command signal (1 point × 32 axes) (Note-3)	×	○
M5520	Smoothing clutch complete signal (2 points × 32 axes)	×	○
M5584	Unusable (16 points)	—	—
M5600 M8191	User device (2592 points)		

○: Valid, ×: Invalid

It can be used as a user device.

POINT

- Total number of user device points
  4592 points
- M2320 to M2399 cannot be used as a device (status) where special relays are assigned
- M3072 to M3135 cannot be used as a common device (command signal).
- M3136 to M3199 cannot be used as a device (command signal) where special relays are assigned.

(Note-1): Do not set M4000 to M5599 as the latch range in virtual mode.
(Note-2): "Virtual servomotor axis status/command signal" occupy only the area of the axis set in the mechanical system program. The unused axis areas in the mechanical system program can be used as a user device.
(Note-3): Unused axis of cam axis command signal can be used as a user device.

7.1.1 Axis status

Axis No.	Device No.
1	M2400 to M2419
2	M2420 to M2439
3	M2440 to M2459
4	M2460 to M2479
5	M2480 to M2499
6	M2500 to M2519
7	M2520 to M2539
8	M2540 to M2559
9	M2560 to M2579
10	M2580 to M2599
11	M2600 to M2619
12	M2620 to M2639
13	M2640 to M2659
14	M2660 to M2679
15	M2680 to M2699
16	M2700 to M2719
17	M2720 to M2739
18	M2740 to M2759
19	M2760 to M2779
20	M2780 to M2799
21	M2800 to M2819
22	M2820 to M2839
23	M2840 to M2859
24	M2860 to M2879
25	M2880 to M2899
26	M2900 to M2919
27	M2920 to M2939
28	M2940 to M2959
29	M2960 to M2979
30	M2980 to M2999
31	M3000 to M3019
32	M3020 to M3039

Signal Name

	Signal Name		Real	Virtual				
				Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Positioning start complete		○	OFF				○
1	Positioning complete			○				
2	In-position							
3	Command in-position			OFF				
4	Speed controlling							
5	Unusable		—	—				—
6	Zero pass		○	○				○
7	Error detection							
8	Servo error detection							
9	Home position return request							
10	Home position return complete							
11	External signals	FLS						
12		RLS						
13	Unusable		—	—				—
14								
15	Servo ready		○	○				○
16	Torque limiting							
17	Unusable		—	—				—
18	Virtual mode continuation operation disable warning signal (Note-1)		○	○				○
19	M-code outputting signal			OFF				

○: Valid

(Note-1) : It is unusable in the real mode.
(Note-2) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-3) : Device area of 17 axes or more is unusable in the Q110BD-SSC.

7.1.2 Axis command signal

Axis No.	Device No.
1	M3200 to M3219
2	M3220 to M3239
3	M3240 to M3259
4	M3260 to M3279
5	M3280 to M3299
6	M3300 to M3319
7	M3320 to M3339
8	M3340 to M3359
9	M3360 to M3379
10	M3380 to M3399
11	M3400 to M3419
12	M3420 to M3439
13	M3440 to M3459
14	M3460 to M3479
15	M3480 to M3499
16	M3500 to M3519
17	M3520 to M3539
18	M3540 to M3559
19	M3560 to M3579
20	M3580 to M3599
21	M3600 to M3619
22	M3620 to M3639
23	M3640 to M3659
24	M3660 to M3679
25	M3680 to M3699
26	M3700 to M3719
27	M3720 to M3739
28	M3740 to M3759
29	M3760 to M3779
30	M3780 to M3799
31	M3800 to M3819
32	M3820 to M3839

Signal Name

	Signal name	Real	Virtual				
			Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Stop command	○	×				○
1	Rapid stop command						
2	Forward rotation JOG start command						
3	Reverse rotation JOG start command						
4	Complete signal OFF command						
5	Unusable	—	—				—
6							
7	Error reset command	○	○				○
8	Servo error reset command						
9	External stop input disable at start command		×				
10	Unusable	—	—				—
11							
12							
13	Address clutch reference setting command (Note-1)	×	×		○		×
14	Cam reference position setting command (Note-1)		×			○	
15	Servo OFF command	○	○				○
16	Gain changing command						
17	Unusable	—	—				—
18							
19	FIN signal	○	×				○

○: Valid, ×: Invalid

(Note-1) : It is unusable in the real mode.
(Note-2) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-3) : Device area of 17 axes or more is unusable in the Q110BD-SSC.

7.1.3 Virtual servomotor axis status

Axis No.	Device No.	Signal Name
1	M4000 to M4019	
2	M4020 to M4039	
3	M4040 to M4059	
4	M4060 to M4079	
5	M4080 to M4099	
6	M4100 to M4119	
7	M4120 to M4139	
8	M4140 to M4159	
9	M4160 to M4179	
10	M4180 to M4199	
11	M4200 to M4219	
12	M4220 to M4239	
13	M4240 to M4259	
14	M4260 to M4279	
15	M4280 to M4299	
16	M4300 to M4319	
17	M4320 to M4339	
18	M4340 to M4359	
19	M4360 to M4379	
20	M4380 to M4399	
21	M4400 to M4419	
22	M4420 to M4439	
23	M4440 to M4459	
24	M4460 to M4479	
25	M4480 to M4499	
26	M4500 to M4519	
27	M4520 to M4539	
28	M4540 to M4559	
29	M4560 to M4579	
30	M4580 to M4599	
31	M4600 to M4619	
32	M4620 to M4639	

	Signal name	Real	Virtual				
			Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Positioning start complete	Backup	○				×
1	Positioning complete						
2	Unusable	—	—				—
3	Command in-position	Backup	○				×
4	Speed controlling						
5	Unusable	—	—				—
6							
7	Error detection	Backup	○				×
8	Unusable	—	—				—
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19	M-code outputting signal	Backup	○				×

○: Valid, ×: Invalid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : The unused axis areas in the mechanical system program can be used as a user device.

7.1.4 Virtual servomotor axis command signal

Axis No.	Device No.	Signal Name
1	M4800 to M4819	
2	M4820 to M4839	
3	M4840 to M4859	
4	M4860 to M4879	
5	M4880 to M4899	
6	M4900 to M4919	
7	M4920 to M4939	
8	M4940 to M4959	
9	M4960 to M4979	
10	M4980 to M4999	
11	M5000 to M5019	
12	M5020 to M5039	
13	M5040 to M5059	
14	M5060 to M5079	
15	M5080 to M5099	
16	M5100 to M5119	
17	M5120 to M5139	
18	M5140 to M5159	
19	M5160 to M5179	
20	M5180 to M5199	
21	M5200 to M5219	
22	M5220 to M5239	
23	M5240 to M5259	
24	M5260 to M5279	
25	M5280 to M5299	
26	M5300 to M5319	
27	M5320 to M5339	
28	M5340 to M5359	
29	M5360 to M5379	
30	M5380 to M5399	
31	M5400 to M5419	
32	M5420 to M5439	

	Signal name	Real	Virtual				
			Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Stop command	×	○				×
1	Rapid stop command						
2	Forward rotation JOG start command						
3	Reverse rotation JOG start command						
4	Complete signal OFF command						
5	Unusable	—	—				—
6							
7	Error reset command	×	○				×
8	Unusable	—	—				—
9	External stop input disable at start command	×	○				×
10	Unusable	—	—				—
11							
12							
13							
14							
15							
16							
17							
18							
19	FIN signal	×	○				×

○: Valid, ×: Invalid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : The unused axis areas in the mechanical system program can be used as a user device.

7.1.5 Cam axis command signal

Device No.	Signal Name
M5488	Axis-1 cam/ball screw switching
M5489	Axis-2 cam/ball screw switching
M5490	Axis-3 cam/ball screw switching
M5491	Axis-4 cam/ball screw switching
M5492	Axis-5 cam/ball screw switching
M5493	Axis-6 cam/ball screw switching
M5494	Axis-7 cam/ball screw switching
M5495	Axis-8 cam/ball screw switching
M5496	Axis-9 cam/ball screw switching
M5497	Axis-10 cam/ball screw switching
M5498	Axis-11 cam/ball screw switching
M5499	Axis-12 cam/ball screw switching
M5500	Axis-13 cam/ball screw switching
M5501	Axis-14 cam/ball screw switching
M5502	Axis-15 cam/ball screw switching
M5503	Axis-16 cam/ball screw switching
M5504	Axis-17 cam/ball screw switching
M5505	Axis-18 cam/ball screw switching
M5506	Axis-19 cam/ball screw switching
M5507	Axis-20 cam/ball screw switching
M5508	Axis-21 cam/ball screw switching
M5509	Axis-22 cam/ball screw switching
M5510	Axis-23 cam/ball screw switching
M5511	Axis-24 cam/ball screw switching
M5512	Axis-25 cam/ball screw switching
M5513	Axis-26 cam/ball screw switching
M5514	Axis-27 cam/ball screw switching
M5515	Axis-28 cam/ball screw switching
M5516	Axis-29 cam/ball screw switching
M5517	Axis-30 cam/ball screw switching
M5518	Axis-31 cam/ball screw switching
M5519	Axis-32 cam/ball screw switching

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.

7.1.6 Smoothing clutch complete signal

Device No.	Signal Name	
M5520	Output axis 1	Main shaft side
M5521		Auxiliary input side
M5522	Output axis 2	Main shaft side
M5523		Auxiliary input side
M5524	Output axis 3	Main shaft side
M5525		Auxiliary input side
M5526	Output axis 4	Main shaft side
M5527		Auxiliary input side
M5528	Output axis 5	Main shaft side
M5529		Auxiliary input side
M5530	Output axis 6	Main shaft side
M5531		Auxiliary input side
M5532	Output axis 7	Main shaft side
M5533		Auxiliary input side
M5534	Output axis 8	Main shaft side
M5535		Auxiliary input side
M5536	Output axis 9	Main shaft side
M5537		Auxiliary input side
M5538	Output axis 10	Main shaft side
M5539		Auxiliary input side
M5540	Output axis 11	Main shaft side
M5541		Auxiliary input side
M5542	Output axis 12	Main shaft side
M5543		Auxiliary input side
M5544	Output axis 13	Main shaft side
M5545		Auxiliary input side
M5546	Output axis 14	Main shaft side
M5547		Auxiliary input side
M5548	Output axis 15	Main shaft side
M5549		Auxiliary input side
M5550	Output axis 16	Main shaft side
M5551		Auxiliary input side
M5552	Output axis 17	Main shaft side
M5553		Auxiliary input side
M5554	Output axis 18	Main shaft side
M5555		Auxiliary input side
M5556	Output axis 19	Main shaft side
M5557		Auxiliary input side
M5558	Output axis 20	Main shaft side
M5559		Auxiliary input side
M5560	Output axis 21	Main shaft side
M5561		Auxiliary input side
M5562	Output axis 22	Main shaft side
M5563		Auxiliary input side
M5564	Output axis23	Main shaft side
M5565		Auxiliary input side
M5566	Output axis 24	Main shaft side
M5567		Auxiliary input side
M5568	Output axis 25	Main shaft side
M5569		Auxiliary input side
M5570	Output axis 26	Main shaft side
M5571		Auxiliary input side
M5572	Output axis 27	Main shaft side
M5573		Auxiliary input side
M5574	Output axis 28	Main shaft side
M5575		Auxiliary input side
M5576	Output axis 29	Main shaft side
M5577		Auxiliary input side
M5578	Output axis 30	Main shaft side
M5579		Auxiliary input side
M5580	Output axis 31	Main shaft side
M5581		Auxiliary input side
M5582	Output axis 32	Main shaft side
M5583		Auxiliary input side

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : The unused axis areas in the mechanical system program can be used as a user device.

7.1.7 Common device

Device No.	Signal Name	
M2000	PLC ready flag	
M2001	Axis 1	Start accept flag
M2002	Axis 2	
M2003	Axis 3	
M2004	Axis 4	
M2005	Axis 5	
M2006	Axis 6	
M2007	Axis 7	
M2008	Axis 8	
M2009	Axis 9	
M2010	Axis 10	
M2011	Axis 11	
M2012	Axis 12	
M2013	Axis 13	
M2014	Axis 14	
M2015	Axis 15	
M2016	Axis 16	
M2017	Axis 17	
M2018	Axis 18	
M2019	Axis 19	
M2020	Axis 20	
M2021	Axis 21	
M2022	Axis 22	
M2023	Axis 23	
M2024	Axis 24	
M2025	Axis 25	
M2026	Axis 26	
M2027	Axis 27	
M2028	Axis 28	
M2029	Axis 29	
M2030	Axis 30	
M2031	Axis 31	
M2032	Axis 32	
M2033	Personal computer fault detection flag	
M2034	Personal computer link communication error flag	
M2035	Motion SFC error history clear request flag	
M2036	Unusable (3 points)	
M2037		
M2038		
M2039	Motion SFC error detection flag	
M2040	Speed switching point specified flag	
M2041	System setting error flag	
M2042	All axes servo ON command	
M2043	Real/virtual mode switching request (Virtual mode only)	
M2044	Real/virtual mode switching status (Virtual mode only)	
M2045	Real/virtual mode switching error detection (Virtual mode only)	
M2046	Out-of-sync warning (Virtual mode only)	
M2047	Motion slot fault detection flag	
M2048	JOG operation simultaneous start command	
M2049	All axes servo ON accept flag	
M2050	Start buffer full	
M2051	Unusable (3 points)	
M2052		
M2053		
M2054	Operation cycle over flag	
M2055	Unusable (6 points)	
M2056		
M2057		
M2058		
M2059		
M2060		
M2061	Axis 1	Speed changing flag
M2062	Axis 2	
M2063	Axis 3	
M2064	Axis 4	
M2065	Axis 5	
M2066	Axis 6	
M2067	Axis 7	
M2068	Axis 8	

Device No.	Signal Name	
M2069	Axis 9	Speed changing flag
M2070	Axis 10	
M2071	Axis 11	
M2072	Axis 12	
M2073	Axis 13	
M2074	Axis 14	
M2075	Axis 15	
M2076	Axis 16	
M2077	Axis 17	
M2078	Axis 18	
M2079	Axis 19	
M2080	Axis 20	
M2081	Axis 21	
M2082	Axis 22	
M2083	Axis 23	
M2084	Axis 24	
M2085	Axis 25	
M2086	Axis 26	
M2087	Axis 27	
M2088	Axis 28	
M2089	Axis 29	
M2090	Axis 30	
M2091	Axis 31	
M2092	Axis 32	
M2093	Unusable (35 points)	
M2094		
M2095		
M2096		
M2097		
M2098		
M2099		
M2100		
M2101		
M2102		
M2103		
M2104		
M2105		
M2106		
M2107		
M2108		
M2109		
M2110		
M2111		
M2112		
M2113		
M2114		
M2115		
M2116		
M2117		
M2118		
M2119		
M2120		
M2121		
M2122		
M2123		
M2124		
M2125		
M2126		
M2127		
M2128	Axis 1	Automatic deceleration flag
M2129	Axis 2	
M2130	Axis 3	
M2131	Axis 4	
M2132	Axis 5	
M2133	Axis 6	
M2134	Axis 7	
M2135	Axis 8	
M2136	Axis 9	
M2137	Axis 10	

Common Device List (Continued)

Device No.	Signal Name		
M2138	Axis 11	Automatic deceleration flag	
M2139	Axis 12		
M2140	Axis 13		
M2141	Axis 14		
M2142	Axis 15		
M2143	Axis 16		
M2144	Axis 17		
M2145	Axis 18		
M2146	Axis 19		
M2147	Axis 20		
M2148	Axis 21		
M2149	Axis 22		
M2150	Axis 23		
M2151	Axis 24		
M2152	Axis 25		
M2153	Axis 26		
M2154	Axis 27		
M2155	Axis 28		
M2156	Axis 29		
M2157	Axis 30		
M2158	Axis 31		
M2159	Axis 32		
M2160	Output axis 1	Main shaft side	Clutch status (Note-3)
M2161		Auxiliary input side	
M2162	Output axis 2	Main shaft side	
M2163		Auxiliary input side	
M2164	Output axis 3	Main shaft side	
M2165		Auxiliary input side	
M2166	Output axis 4	Main shaft side	
M2167		Auxiliary input side	
M2168	Output axis 5	Main shaft side	
M2169		Auxiliary input side	
M2170	Output axis 6	Main shaft side	
M2171		Auxiliary input side	
M2172	Output axis 7	Main shaft side	
M2173		Auxiliary input side	
M2174	Output axis 8	Main shaft side	
M2175		Auxiliary input side	
M2176	Output axis 9	Main shaft side	
M2177		Auxiliary input side	
M2178	Output axis 10	Main shaft side	
M2179		Auxiliary input side	
M2180	Output axis 11	Main shaft side	
M2181		Auxiliary input side	
M2182	Output axis 12	Main shaft side	
M2183		Auxiliary input side	
M2184	Output axis 13	Main shaft side	
M2185		Auxiliary input side	
M2186	Output axis 14	Main shaft side	
M2187		Auxiliary input side	
M2188	Output axis 15	Main shaft side	
M2189		Auxiliary input side	
M2190	Output axis 16	Main shaft side	
M2191		Auxiliary input side	
M2192	Output axis 17	Main shaft side	
M2193		Auxiliary input side	
M2194	Output axis 18	Main shaft side	
M2195		Auxiliary input side	
M2196	Output axis 19	Main shaft side	
M2197		Auxiliary input side	
M2198	Output axis 20	Main shaft side	
M2199		Auxiliary input side	
M2200	Output axis 21	Main shaft side	
M2201		Auxiliary input side	
M2202	Output axis 22	Main shaft side	
M2203		Auxiliary input side	
M2204	Output axis 23	Main shaft side	
M2205		Auxiliary input side	
M2206	Output axis 24	Main shaft side	
M2207		Auxiliary input side	

Device No.	Signal Name		
M2208	Output axis 25	Main shaft side	Clutch status (Note-3)
M2209		Auxiliary input side	
M2210	Output axis 26	Main shaft side	
M2211		Auxiliary input side	
M2212	Output axis 27	Main shaft side	
M2213		Auxiliary input side	
M2214	Output axis 28	Main shaft side	
M2215		Auxiliary input side	
M2216	Output axis 29	Main shaft side	
M2217		Auxiliary input side	
M2218	Output axis 30	Main shaft side	
M2219		Auxiliary input side	
M2220	Output axis 31	Main shaft side	
M2221		Auxiliary input side	
M2222	Output axis 32	Main shaft side	
M2223		Auxiliary input side	
M2224	Unusable (16 points)		
M2225			
M2226			
M2227			
M2228			
M2229			
M2230			
M2231			
M2232			
M2233			
M2234			
M2235			
M2236			
M2237			
M2238			
M2239			
M2240	Axis 1	Speed change "0" accepting flag	
M2241	Axis 2		
M2242	Axis 3		
M2243	Axis 4		
M2244	Axis 5		
M2245	Axis 6		
M2246	Axis 7		
M2247	Axis 8		
M2248	Axis 9		
M2249	Axis 10		
M2250	Axis 11		
M2251	Axis 12		
M2252	Axis 13		
M2253	Axis 14		
M2254	Axis 15		
M2255	Axis 16		
M2256	Axis 17		
M2257	Axis 18		
M2258	Axis 19		
M2259	Axis 20		
M2260	Axis 21		
M2261	Axis 22		
M2262	Axis 23		
M2263	Axis 24		
M2264	Axis 25		
M2265	Axis 26		
M2266	Axis 27		
M2267	Axis 28		
M2268	Axis 29		
M2269	Axis 30		
M2270	Axis 31		
M2271	Axis 32		
M2272	Unusable (6 points)		
M2273			
M2274			
M2275			
M2276			
M2277			

Common Device List (Continued)

Device No.	Signal Name	Device No.	Signal Name
M2278	Unusable (21 points)	M2299	Unusable (21 points)
M2279		M2300	
M2280		M2301	
M2281		M2302	
M2282		M2303	
M2283		M2304	
M2284		M2305	
M2285		M2306	
M2286		M2307	
M2287		M2308	
M2288		M2309	
M2289		M2310	
M2290		M2311	
M2291		M2312	
M2292		M2313	
M2293		M2314	
M2294		M2315	
M2295		M2316	
M2296		M2317	
M2297		M2318	
M2298		M2319	

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : Device area of 17 axes or more is unusable in the Q110BD-SSC.
(Note-3) : This signal is unusable in the real mode.

(1) Personal computer fault detection flag (M2033)・・・・・・・・・・・・・・・ Status signal
If a personal computer fault is detected during execution of the personal computer monitoring function, the personal computer fault detection flag is set.
- ON :personal computer is fault detected.
- OFF :personal computer is normal.

The detail of this personal computer monitoring function is in the section 8.2

7.2 Data Registers

(1) Data register list

Device No.	Purpose	Real	Virtual
D0	Axis monitor device (20 points × 32 axes) Real mode ・・・・・・・ Each axis Virtual mode・・・・・・ Output module		
D640	Control change register (2 points × 32 axes)	○	○
D704	Unusable (96 points)	—	—
D800	Virtual servomotor axis monitor device (6 points × 32 axes) (Note-1)	○	○
	Current value after virtual servomotor axis main shaft's differential gear (4 points × 32 axes) (Note-1)	—	—
D1120	Unusable (120 points)	○	○
D1240	Cam axis monitor device (10 points × 32 axes) (Note-1)	—	—
D5600 D8191	User device (2592 points)	Backup	○

○: Valid, ×: Invalid

□ It can be used as an user device.

POINT

- Total number of user device points
  6632 points
- D704 to D799 cannot be used as a common device.

(Note-1): "The virtual servomotor axis/cam axis monitor device" occupies only the areas of the axes set in the mechanical system program. The unused axis areas in the mechanical system program can be used as a user side.

7.2.1 Axis monitor device

Axis No.	Device No.
1	D0 to D19
2	D20 to D39
3	D40 to D59
4	D60 to D79
5	D80 to D99
6	D100 to D119
7	D120 to D139
8	D140 to D159
9	D160 to D179
10	D180 to D199
11	D200 to D219
12	D220 to D239
13	D240 to D259
14	D260 to D279
15	D280 to D299
16	D300 to D319
17	D320 to D339
18	D340 to D359
19	D360 to D379
20	D380 to D399
21	D400 to D419
22	D420 to D439
23	D440 to D459
24	D460 to D479
25	D480 to D499
26	D500 to D519
27	D520 to D539
28	D540 to D559
29	D560 to D579
30	D580 to D599
31	D600 to D619
32	D620 to D639

Signal Name

	Signal Name	Real	Virtual				
			Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Feed current value/roller cycle speed	○	○				○
1							
2	Real current value						
3							
4	Deviation counter value						
5							
6	Minor error code						
7	Major error code						
8	Servo error code						
9	Home position return re-travel value		Backup				Backup
10	Travel value after proximity dog ON						
11							
12	Execute program No.		×				○
13	M-code		—				
14	Torque limit value						
15	Data set pointer for constant-speed control		×				○
16	Unusable	—	—				—
17							
18	Real current value at stop input	○	Backup				○
19							

○: Valid, ×: Invalid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : Device area of 17 axes or more is unusable in the Q110BD-SSC.

7.2.2 Control change register

Axis No.	Device No.	Signal Name
1	D640, D641	
2	D642, D643	
3	D644, D645	
4	D646, D647	
5	D648, D649	
6	D650, D651	
7	D652, D653	
8	D654, D655	
9	D656, D657	
10	D658, D659	
11	D660, D661	
12	D662, D663	
13	D664, D665	
14	D666, D667	
15	D668, D669	
16	D670, D671	
17	D672, D673	
18	D674, D675	
19	D676, D677	
20	D678, D679	
21	D680, D681	
22	D682, D683	
23	D684, D685	
24	D686, D687	
25	D688, D689	
26	D690, D691	
27	D692, D693	
28	D694, D695	
29	D696, D697	
30	D698, D699	
31	D700, D701	
32	D702, D703	

\	Signal Name	Real	Virtual
0	JOG speed setting	○	○
1			

○: Valid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : Device area of 17 axes or more is unusable in the Q110BD-SSC.

7.2.3 Virtual servomotor axis monitor device

Axis No.	Device No.	Signal Name
1	D800 to D809	
2	D810 to D819	
3	D820 to D829	
4	D830 to D839	
5	D840 to D849	
6	D850 to D859	
7	D860 to D869	
8	D870 to D879	
9	D880 to D889	
10	D890 to D899	
11	D900 to D909	
12	D910 to D9019	
13	D920 to D929	
14	D930 to D939	
15	D940 to D949	
16	D950 to D959	
17	D960 to D969	
18	D970 to D979	
19	D980 to D989	
20	D990 to D999	
21	D1000 to D1009	
22	D1010 to D1019	
23	D1020 to D1029	
24	D1030 to D1039	
25	D1040 to D1049	
26	D1050 to D1059	
27	D1060 to D1069	
28	D1070 to D1079	
29	D1080 to D1089	
30	D1090 to D1099	
31	D1100 to D1109	
32	D1110 to D1119	

	Signal Name	Real	Virtual				
			Roller	Ball screw	Rotary table	Cam	Real mode axis
0	Feed current value	Backup	○				×
1							
2	Minor error code						
3	Major error code						
4	Execute program No.						
5	M-code						
6	Current value after virtual servomotor axis main shaft's differential gear						
7							
8	Error search output axis No.						
9	Data set pointer for constant-speed control						

○: Valid, ×: Invalid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : Device area of 17 axes or more is unusable in the Q110BD-SSC.
(Note-3) : The unused axis areas in the mechanical system program can be used as a user device.

7.2.4 Cam axis monitor device

Axis No.	Device No.	Signal Name
1	D1240 to D1249	
2	D1250 to D1259	
3	D1260 to D12569	
4	D1270 to D1279	
5	D1280 to D1289	
6	D1290 to D1299	
7	D1300 to D1309	
8	D1310 to D1319	
9	D1320 to D1329	
10	D1330 to D1339	
11	D1340 to D1349	
12	D1350 to D1359	
13	D1360 to D1369	
14	D1370 to D1379	
15	D1380 to D1389	
16	D1390 to D1399	
17	D1400 to D1409	
18	D1410 to D1419	
19	D1420 to D1429	
20	D1430 to D1439	
21	D1440 to D1449	
22	D1450 to D1459	
23	D1460 to D1469	
24	D1470 to D1479	
25	D1480 to D1489	
26	D1490 to D1499	
27	D1500 to D1509	
28	D1510 to D1519	
29	D1520 to D1529	
30	D1530 to D1539	
31	D1540 to D1549	
32	D1550 to D1559	

	Signal name	Real	Virtual
0	Unusable	—	—
1	Execute cam No.	Backup	○
2	Execute stroke amount		
3			
4	Current value within 1 cam shaft revolution		
5			
6	Unusable	—	—
7			
8			
9			

○: Valid

(Note-1) : The range of axis No.1 to 16 is valid in the Q110BD-SSC.
(Note-2) : Device area of 17 axes or more is unusable in the Q110BD-SSC.
(Note-3) : The unused axis areas in the mechanical system program can be used as a user device.

7.3 Motion Registers (#)

Axis No.	Device No.	Signal Name
1	#8064 to #8067	
2	#8068 to #8071	
3	#8072 to #8075	
4	#8076 to #8079	
5	#8080 to #8083	
6	#8084 to #8087	
7	#8088 to #8091	
8	#8092 to #8095	
9	#8096 to #8099	
10	#8100 to #8103	
11	#8104 to #8107	
12	#8108 to #8111	
13	#8112 to #8115	
14	#8116 to #8119	
15	#8120 to #8123	
16	#8124 to #8127	
17	#8128 to #8131	
18	#8132 to #8135	
19	#8136 to #8139	
20	#8140 to #8143	
21	#8144 to #8147	
22	#8148 to #8151	
23	#8152 to #8155	
24	#8156 to #8159	
25	#8160 to #8163	
26	#8164 to #8167	
27	#8168 to #8171	
28	#8172 to #8175	
29	#8176 to #8179	
30	#8180 to #8183	
31	#8184 to #8187	
32	#8188 to #8191	

	Signal Name
+0	Servo amplifier type
+1	Motor current
+2	Motor speed
+3	

7.4 Special Relays / Special Registers

7.4.1 Special Relays(SP.M)

Special relays refer to internal relays whose specifications are defined for use in the Motion board. Therefore, on Motion SFC programs, special relays cannot be used in the same manner that standard internal relays are used. Turn ON or OFF special relays to control the Motion board as required.

The table below explains terms used in the following list.

Item	Description
Device No.	• Refers to a device number of special relays.
Signal name	• Refers to a name of special relays.
Meaning	• Refers to meaning of special relays.
Details	• Refers to details of special relays
Set by (When set)	• Refers to the setter of the special relay, together with the setting timing. <Setter> S : The system side (Motion board) U : The user side (using the Motion SFC program or performing test operation from peripheral devices.) S/U : Both the system (Motion board) and user sides. <Setting timing> Setting timings are indicated only when set by the system side (Motion board). Main processing : Set repeatedly at main processing (processing performed at CPU idle time Initial processing : Set only at initial processing (e.g. power-on, reset cancel). Change status : Set only when status has been changed Occur an error : Set when an error has occurred. Request : Set only when requested by the user (by using special relays, etc.) . Operation cycle : Set at every motion operation cycle.

Device No.	Signal Name	Meaning	Details	Set by (When set)
M9005	AC/DC DOWN detection	OFF : AC/DC DOWN not detected ON : AC/DC DOWN detected	• Turns on when a momentary power interruption of 5VDC occurs, and reset by turning power off to on.	S (Occur an error)
M9006	Battery low	OFF : Normal ON : Battery low	• Turns on when the voltage of the battery reduces to less than specified value. Turns off when the voltage of the battery becomes normal. • Synchronizes with "BAT. LED"	
M9007	Battery low latch	OFF : Normal ON : Battery low	• Turns on when the voltage of the battery reduces to less than specified value. Turns off when the voltage of the battery becomes normal. • Synchronizes with "BAT. LED"	
M9008	Self-diagnostic error	OFF : No error ON : Error	• Turns on when error is found as a result of self-diagnosis. Remains on if normal status is restored.	
M9010	Diagnostic error	OFF : No error ON : Error	• Turns on when error is found as a result of diagnosis. Remains on if normal status is restored.	
M9025	Clock data set request	OFF : Ignored ON : Set request present used	• Write clock data stored in D9025 to D9028 to the clock element when M9025 has changed from off to on.	U
M9026	Clock data error	OFF : No error ON : Error	• Turns on by clock data (D9025 to D9028) error.	S (Request)
M9028	Clock data read request	OFF : Ignored ON : Read request	• Read clock data from D9025 to D9028 in BCD when M9028 is on.	U
M9036	Always ON	ON OFF	• Turns on without regard to position of RUN/STOP switch on.	S (Main processing)
M9037	Always OFF	ON OFF	• Turns off without regard to position of RUN/STOP switch on.	
M9060	Error reset	OFF → ON : Error reset	• A release of the error is executed.	U
M9073	PCPU WDT error flag	ON : Abnormal OFF : Normal	• Turns on when a "watchdog timer error" is detected by the Motion CPU self-diagnosis function. When the Motion CPU detects a WDT error, it executes an immediate stop without deceleration of the operating axes. • The error cause is stored in the "Motion CPU WDT error cause (D9184)".	S (Occur an error)
M9074	PCPU READY complete flag	ON : PCPU READY completion OFF : PCPU READY uncompletion	• When the PLC ready flag (M2000) turns off to on, the fixed parameters, servo parameters and limit switch output data, etc., are checked, and if no error is detected this flag turns on. • Turns off when the PLC ready flag (M2000) turns off.	S (Request)
M9075	Test mode ON flag	ON : TEST mode is in effect. OFF : TEST mode is not in effect.	• This flag status indicates whether a TEST mode established from a peripheral device is currently in effect. • If the TEST mode is not established in response to a TEST mode request from a peripheral device, the "TEST mode request error flag (M9078)" will turn on.	
M9076	External forced stop input flag	ON : Forced stop OFF OFF : Forced stop ON	• This flag status indicates whether the forced stop input is on or off.	S (Operation cycle)
M9078	TEST mode request error flag	ON : Abnormal OFF : Normal	• Turns on if the TEST mode is not established in response to a TEST mode request from a peripheral device. • When this relay turns on, the error content is stored at the TEST mode request error register (D9182 to D9183).	S (Occur an error)
M9079	Servo program setting error flag	ON : Abnormal OFF : Normal	• This flag status indicates whether the positioning data of the servo program(K) specified with the Motion SFC program is normal or abnormal, and if error is detected this flag turns on. • The content of a servo program setting error is stored at D9189 and D9190.	

7.4.2 Special Registers (SP.D)

Special registers refer to internal registers whose specifications are defined for use in the Motion board. Therefore, on Motion SFC programs, special registers cannot be used in the same manner that standard internal registers are used. Write data to special registers to control the Motion board as required.
In special registers, data is stored in binary form, unless otherwise specified.

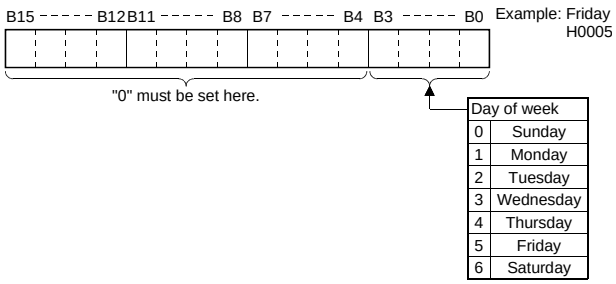
The table below explains terms used in the following list.

Item	Item explanation
Device No.	• Refers to a device number of special registers.
Signal name	• Refers to a name of special registers
Meaning	• Refers to meaning of special registers.
Details	• Refers to details of special registers.
Set by (When set)	• Refers to the setter of the special relay, together with the setting timing.. <Setter> S : The system side (Motion board) U : The user side (using the Motion SFC program or performing test operation from peripheral devices.) S/U : Both the system (Motion board) and user sides. <Setting timing> Setting timings are indicated only when set by the system side (Motion board). Main processing : Set repeatedly at main processing (processing performed at CPU idle time Initial processing : Set only at initial processing (e.g. power-on, reset cancel). Change status : Set only when status has been changed Occur an error : Set when an error has occurred. Request : Set only when requested by the user (by using special relays, etc.) . Operation cycle : Set at every motion operation cycle.

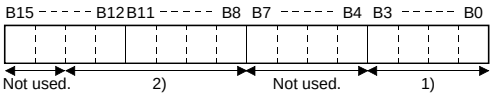
Each becoming at the moment of DC5V the power failure while the motion board is operating +1 is done, and the value is stored by the BIN code.

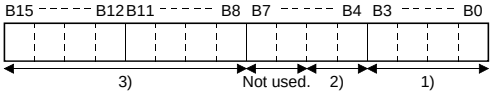
Device No.	Signal Name	Meaning	Details	Set by (When Set)
D9005	AC/DC DOWN counter No.	Number of timesfor AC/DC DOWN	• 1 is added to the stored value each time a momentary power interruption of 5VDC occurs while the Motion board is running, and the value is stored in BIN code.	S (Occur an error)
D9008	Diagnostic error	Dignostic error number	• When error is found as a result of self-diagnosis, error No. is stored in BIN code. • Refer to the "Q173HCPU/Q172HCPU Motion Controller Programming Manual (COMMON)" 2.4 Multiple CPU Error Codes" " for details of the error code.	
D9010	Diagnostic error occurrence time	Diagnostic error occurrence time	• The age (A.D, the rightmost two digits) when data on D9008 are updated, and the month stored with a BCD code two digits. B15 to B8 B7 to B0 Year (0 to 99) | Month (1 to 12) Example: November, 2001 H0111	
D9011			• The day when data on D9008 are updated, and the hour stored with a BCD code two digits. B15 to B8 B7 to B0 Day (1 to 31) | Hour (0 to 23) Example: 25th, 10 a.m. H2510	
D9012			• The minute when data on D9008 are updated, and the second stored with a BCD code two digits. B15 to B8 B7 to B0 Minute (0 to 59) | Second (0 to 59) Example: 35min., 48sec. H3548	
D9013	Error information classification	Error information classification code	• The classification code to judge the diagnostic error stored in the error information (D9014) is stored. • The following codes are stored. 0: None 1: Module No./CPU No./Base No. 2: Parameter No.	
D9014	Error information	Error information	• Error information to comply with the diagnostic error (D9008) is stored. There are following two types information to be stored. 1) Module No./CPU No./Base No. 2) Parameter No.	
D9015	Operating state of CPU	Operating state of CPU	• The operation states of CPU as shown below are stored in D9015. B15 B12 B11 B8 B7 B4 B3 B0 2) 1) 1) Operating state of CPU: 0: RUN, 2: STOP 2) STOP cause: 0: RUN/STOP switch, 4: Error Note: Priority is earliest first	S (Main processing)
D9017	Scan time	Scan time (1ms units)	• Main cycle is stored in 1ms units. Setting range (0 to 65535[ms])	
D9019	Maximum scan time	Maximum scan time (1ms units)	• The maximum value of the main cycle is stored in 1ms units. Setting range (0 to 65535[ms])	
D9025	Clock data	Clock data (Year, month)	• Stores the year (2 lower digits) and month in BCD. B15 B12 B11 B8 B7 B4 B3 B0 Year Month Example: July, 2005 H0507	S/U (Request)
D9026	Clock data	Clock data (Day, hour)	• Stores the day and hour in BCD. B15 B12 B11 B8 B7 B4 B3 B0 Day Hour Example: 31st., 10 a.m. H3110	
D9027	Clock data	Clock data (Minute, second)	• Stores the minute and second in BCD. B15 B12 B11 B8 B7 B4 B3 B0 Minute Second Example: 35 min., 48 sec. H3548	

Special Register List (Continued)

<table>
<tr><th>Device No.</th><th>Signal Name</th><th>Meaning</th><th>Details</th><th>Set by (When Set)</th></tr>
<tr><td>D9028</td><td>Clock data</td><td>Clock data
(Day of week)</td><td>• Stores the day of the week in BCD.
 
</td><td>S/U (Request)</td></tr>
<tr><td>D9060</td><td>Error reset</td><td>Error reset</td><td>• Error No. of canceling error is stored.</td><td>U</td></tr>
<tr><td rowspan="4">D9112</td><td rowspan="4">Connect/
disconnect</td><td rowspan="4">Connect/
disconnect of
SSCNET</td><td>• When the servo amplifier or SSCNET cable of SSCNET system are exchanged or re-connected, a user side requests connect/disconnect for a specific axis, then the system side accepts the request and then wait for the execution command of connect/disconnect.</td><td>—</td></tr>
<tr><td>0 : Waiting for connect/disconnect command
-1 : Waiting for Connect/disconnect execute</td><td>S (Main processing)</td></tr>
<tr><td>1 to 32 : Command for which axis is to be connected/disconnected
-10 : Connect command
-2 : Connect/disconnect execute command</td><td rowspan="2">U</td></tr>
<tr><td></td></tr>
<tr><td>D9182
D9183</td><td>Test mode
request error
information</td><td>Information on an axis status while a test mode request error occurred.</td><td>• The axis was stopped: 0/Operating: 1 while a test mode request error occurred. Information is stored as a bit data.
D9182: b0 to b15 (Axis 1 to Axis 16)
D9183: b0 to b15 (Axis 17 to Axis 32)</td><td rowspan="2">S (Occur an error)</td></tr>
<tr><td>D9184</td><td>Motion CPU WDT
error cause</td><td>Error meaning
of WDT error
occurance</td><td>• The following error codes are stored in D9184.
1 : S/W fault 1
2 : Operation cycle over
3 : Q bus WDT error
4 : WDT error
30 : Information processor H/W error
250 to 253 : Servo amplifier interface H/W fault
300 : S/W fault3
301 : 15 CPSTART instructions of 8 or more points were started simultaneously.</td></tr>
<tr><td>D9188</td><td>Motion operation
cycle</td><td>Motion operation
cycle</td><td>• The time when the motion operation cycle is stored in [μs] units.</td><td>S (Operation cycle)</td></tr>
<tr><td>D9189</td><td>Error program No.</td><td>Error program No.
of servo program</td><td>• When the servo program setting error flag (M9079) turns on, the erroneous servo program No. will be stored.</td><td rowspan="2">S (Occur an error)</td></tr>
<tr><td>D9190</td><td>Error item
information</td><td>Error code of
servo program</td><td>• When the servo program setting error flag (M9079) turns on, the error code corresponding to the erroneous setting item will be stored.</td></tr>
<tr><td>D9191
D9192</td><td>Servo amplifier
loading
information</td><td>Servo amplifier
loading
information</td><td>• The loading status (loading: 1/non-loading: 0) of the servo amplifier is checked during initialization process, and stored as the bit data.
D9191: b0 to b15 (axis 1 to axis 16)
D9192: b0 to b15 (axis 17 to axis 32)
• The axis which turned from non-loading to loading status after power-on is handled as loaded. (However, the axis which turned from loading to nonloading status remains as loaded.)</td><td>S (Initial processing)</td></tr>
<tr><td>D9193
D9194
D9195</td><td>Real/virtual mode
switching error</td><td>Real/virtual mode
Switching error
code</td><td>• When a mode switching error occurs in real-to-virtual or virtual-to-real mode switching, or a mode continuation error occurs in the virtual mode, its error information is stored.</td><td>S (Occur an error)</td></tr>
<tr><td>D9197</td><td>Operation cycle
of the Motion
CPU setting</td><td>Operation cycle
of the Motion
CPU setting</td><td>• The time when the setting operation cycle is stored in [μs] units.</td><td>S (Initial processing)</td></tr>
</table>

Special Register List (Continued)

<table>
<tr><th>Device No.</th><th>Signal Name</th><th>Meaning</th><th>Details</th><th>Set by (When Set)</th></tr>
<tr><td>D9200</td><td>State of switch</td><td>State of motion board switch</td><td>• The Motion board switch status is stored in the following format.
 

<table>
<tr><td>1) Utility switch status</td><td>0: RUN
1: STOP
2: L.CLR</td></tr>
<tr><td>2) Dip switch</td><td>B8 through B9 correspond to the mode setting dip switches No.1 and No.2. B10 through B13 correspond to the board ID number setting dip switches No.1 to No.4.
0: OFF/1: ON
B14 through B15 are not used.</td></tr>
</table></td><td>S (Main processing)</td></tr>
<tr><td>D9201</td><td>State of LED</td><td>LED state of Motion board and Motion Board Utility screen</td><td>• Information concerning which of the following states the LEDs on the Motion board or Motion Board Utility screen are in is stored in the following bit patterns
• 0 is off, 1 is on, and 2 is flicker
 

1): RUN
2): ERROR
3): M.RUN
4): BAT.ALARM
5): BOOT
6): Not used
7): Not used
8): MODE
Bit patterns for MODE
0: OFF 1: Green
2: Orange</td><td>S (Change status)</td></tr>
</table>

MEMO

8. AUTO RUN FUNCTION

8.1 Outline of auto run function

If the auto run function is made valid, the PLC ready signal (M2000) is automatically turned on to run the PLC when the Motion Board is turned on. After starting operation with the auto run function, the button operation of the Motion Board utility S/W (Motion Board Utility) can be used to keep running or to stop operation.
If the auto run function is not used, the button operation of the Motion Board utility S/W (Motion Board Utility) must be used to run or stop operation.

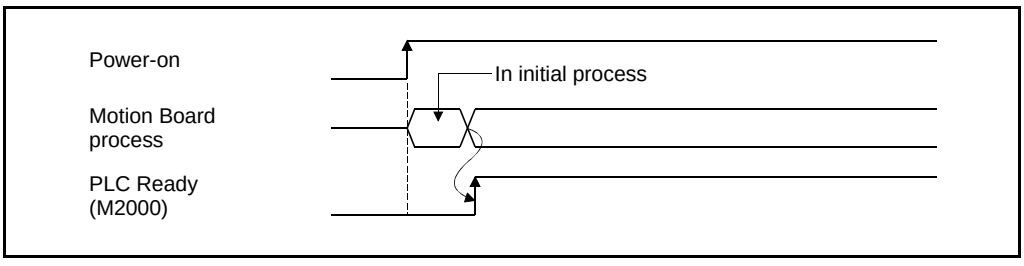
8.1.1 How to set the auto run function

Use the system setting to validate or invalidate the auto run function (new setting screen). The auto run parameter becomes valid after the Motion Board is turned off then on again or with the reset operation of the Motion Board utility S/W (Motion Board Utility).

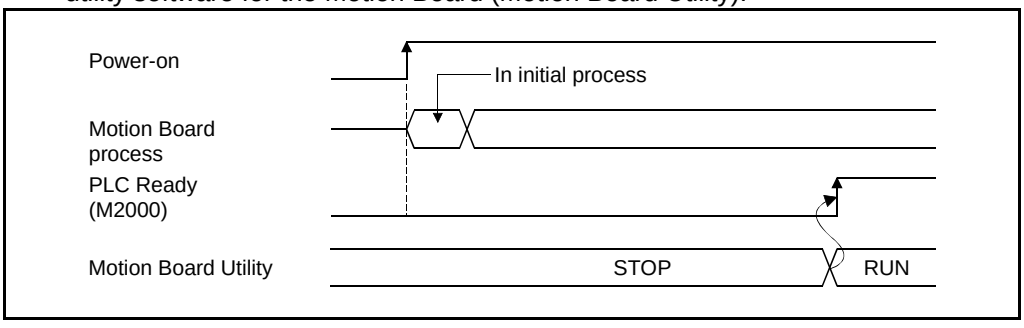
The relationship between the auto run function setting and the power-on and resetting operations is shown below.

Setting / Description of operation	Auto run setting	
	Valid	**Invalid**
・Power-on ・Resetting operation with utility ・Re-start or reset of PC	RUN	STOP (STOP to RUN utility operation)

(1) Validating the auto run function
With the auto run function validated, the PLC ready signal (M2000) is automatically turned on to run the PLC when the Motion Board is turned on.



(2) Invalidating the auto run function
To run or stop the PLC with the auto run function invalidated, use keys in the utility software for the Motion Board (Motion Board Utility).



8.2 PC monitoring function

The Motion Board (Q111BD-SSC/Q110BD-SSC) monitors whether the PC operates normally or not. The monitoring function is realized with the Motion Board and the Motion Board driver of the PC.
The monitoring process starts to operate and keeps monitoring when the Motion Board starts correctly and the Motion Board driver of the PC starts to process.
If a fault (hang-up, etc.) is detected while the PC is monitored, the ERR LED lights up and the PC fault detection flag (M2033) is set.

POINT

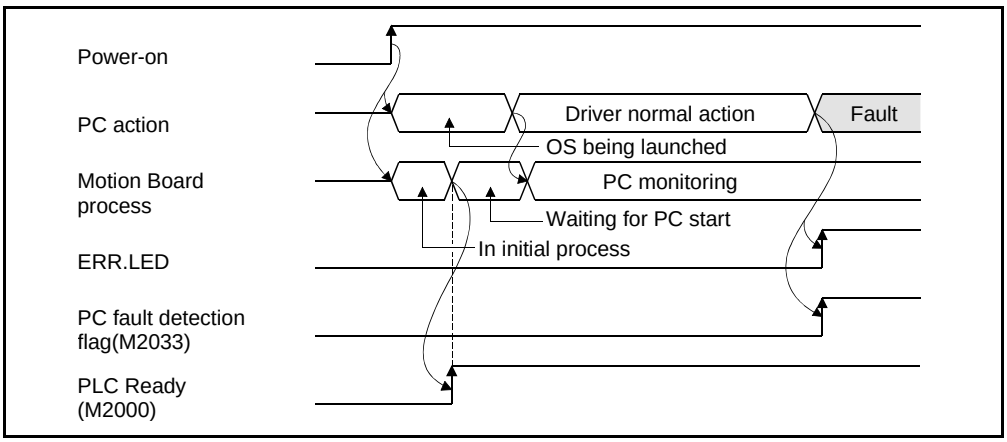
The PC monitoring period is about 355.msec (3.55msecx100 times).
If the PC hangs or fails to operate correctly while Windows is launched, the PC monitoring function does not function correctly.

8.2.1 Outline of PC monitoring function

If a PC fault is detected during execution of the PC monitoring function, the operation continues or is interrupted according to the "action setting upon PC fault."
Use the system setting to define the "action setting upon PC fault."

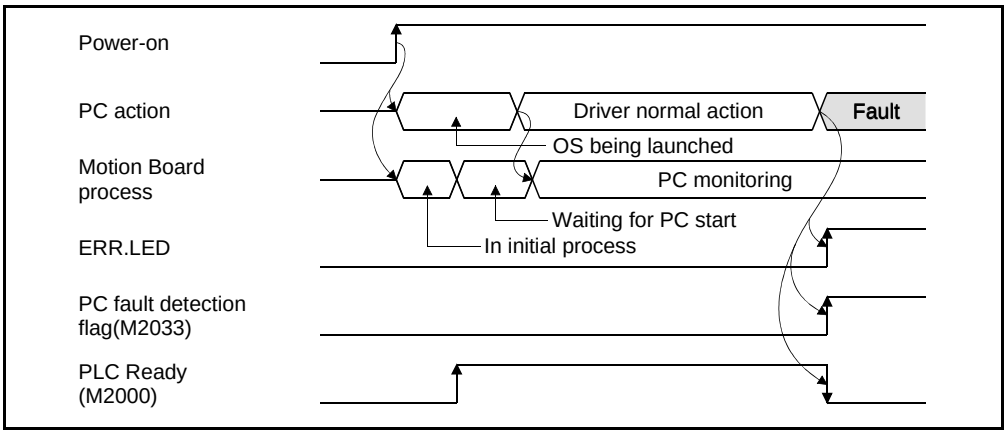
An outline of the action occurring at detection of a PC fault is shown below.

(1) If "continuous operation" is specified in the "action setting upon PC fault".
The PC fault detection flag (M2033) is set upon detection of the PC fault.
The Motion Board keeps running.



(note 1 : M2000 is turned on in the above diagram. This assumes that the auto run function is validated.)

(2) If "discontinuation of operation" is specified in the "action setting upon PC fault"
The PC fault detection flag (M2033) is set upon detection of a PC fault, and PLC Ready (M2000) is turned off, stopping the Motion Board.



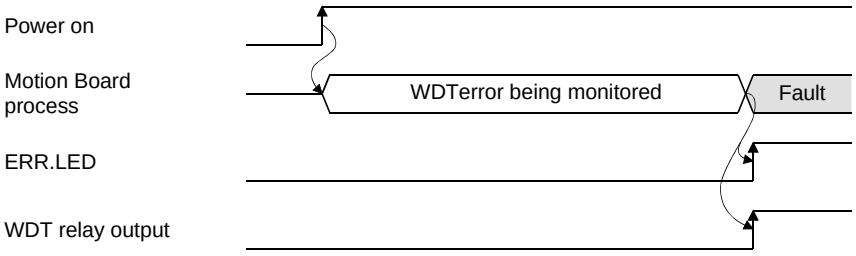
(note 1 : M2000 is turned on in the above diagram. This assumes that the auto run function is validated.)

8.3 Outline of WDT relay output function

The WDT relay output function makes the WDT error, which is detected by the Motion Board, output from the WDT relay output terminal.

The WDT error code detected by the Motion Board, ERR.LED status and WDT relay output status action timings is shown below.

Error code	Cause of error	Action at error occurrence	Remedy
1	S/W fault 1	All axes are stopped immediately and start is prohibited.	・Reset. ・If the error persists even after resetting, (1) Enter a larger calculation period to the system setting. (2) Decrease the number of instructions in the event class, using the Motion SFC program.
2	Calculation period over		
4	WDT error		・Reset. ・If the error persists even after resetting, explain the error symptom and get advice from our sales representative.
250 to 253	H/W fault of servo amplifier I/F		
300	S/W fault 3		Reset
301	A CPSTART instruction of 8 or more points is started beyond the simultaneously starting program count limit.		・Reset. ・Reduce the CPSTART instruction of 8 or more points to within the simultaneously starting program count limit.



8.4 Compatibility with user application

User created data such as Motion SFC and mechanism programs are compatible with Q173HCPU/Q172HCPU.
However, because the number of controlled axes of Q110BD-SSC is 16, when utilizing data that is user-created on Q173HCPU for Q110BD-SSC, examine the program to see if 17 or more axes were being controlled.
For set values in system settings and servo data setting, those set for the 17th or later axes will be invalid.
For details, refer to Help of SW6RNC-GSVE-E0011.

8.5 Data Batch Transfer Function between Personal Computer and Motion Board

Data batch transfer can be made between a personal computer and a motion board by using PCI 2-port memory.
The following three methods are available for data batch transfer.

- Data batch transfer with an automatic refresh in the operation cycle
- Data batch transfer with an automatic refresh in the main cycle
- Data batch transfer with Motion SFC program (BMOV instruction)

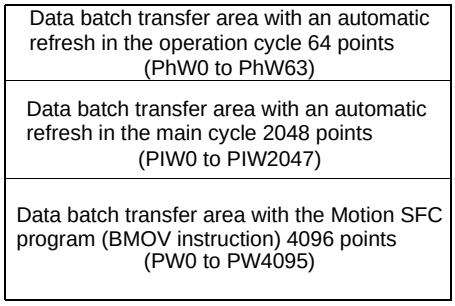
Data between the personal computer and the motion board are communicated in a fixed cycle or main cycle by using the data batch transfer function with the automatic refresh in the operation cycle or main cycle. The data can be communicated at any time using the data batch transfer with the Motion SFC program (BMOV instruction).

The transfer points are shown below.
(1) Transfer points

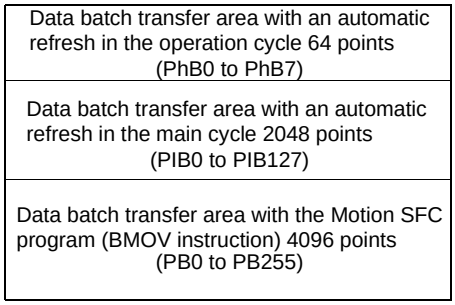
Data batch transfer method		Bit (Total)	Word (Total)
Data batch transfer with an automatic refresh in the operation cycle	Motion Board → PCI2 port	128 points	64 points
	Motion Board ← PCI2 port		
Data batch transfer with an automatic refresh in the main cycle	Motion Board → PCI2 port	2048 points	2048 points
	Motion Board ← PCI2 port		
Data batch transfer with SFC program (BMOV instruction)	Motion Board → PCI2 port	4096 points	4096 points
	Motion Board ← PCI2 port		

(2) Area configuration for data batch transfer

(a) Word device area


Data batch transfer area with an automatic refresh in the operation cycle 64 points
(PhW0 to PhW63)
Data batch transfer area with an automatic refresh in the main cycle 2048 points
(PIW0 to PIW2047)
Data batch transfer area with the Motion SFC program (BMOV instruction) 4096 points
(PW0 to PW4095)

(b) Bit device area


Data batch transfer area with an automatic refresh in the operation cycle 64 points
(PhB0 to PhB7)
Data batch transfer area with an automatic refresh in the main cycle 2048 points
(PIB0 to PIB127)
Data batch transfer area with the Motion SFC program (BMOV instruction) 4096 points
(PB0 to PB255)

8.5.1 Data Batch Transfer with Automatic Refresh in Operation Cycle and Main Cycle

(1) Automatic refresh

The auto refresh function allows data communication between the motion board device memory and PCI2-port memory.

Data communication between a personal computer and the PCI2-port memory is performed with API that contains functions for SSCNET communication. For information on how to use the API, refer to Help of SW6RN-SNETP-E0011.)

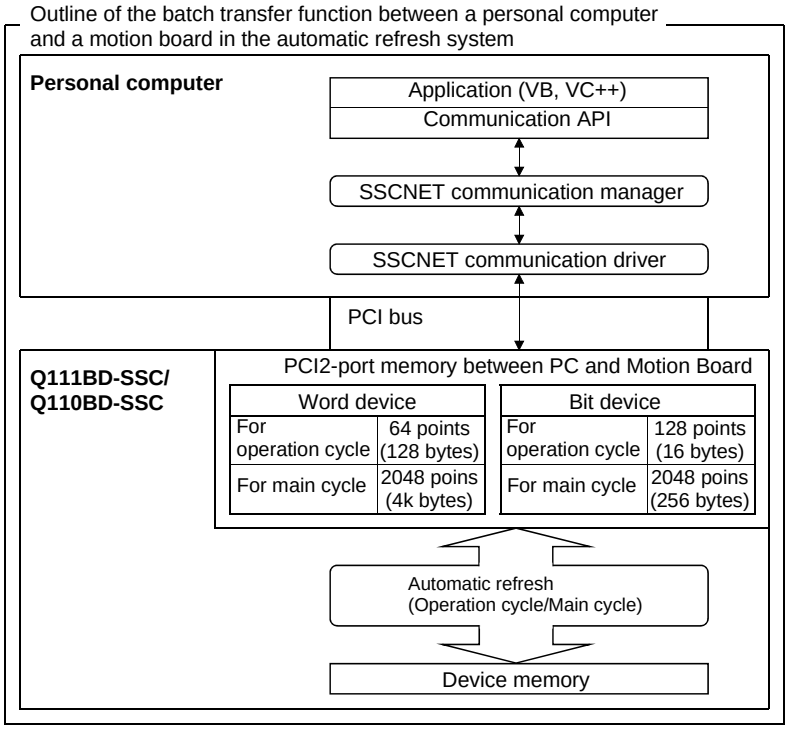
By using the automatic refresh, the data on the personal computer is read, and then can be used as internal device data.

Data communication is performed with the following timings.

(a) Data communication between device memory and PCI2-port memory
- Once per operation cycle
- Once per main cycle

(b) Data communication between a personal computer and PCI2-port memory.
- When the personal computer calls the API functions

The following shows the outline of the batch transfer function between a personal computer and a motion board in the automatic refresh system.



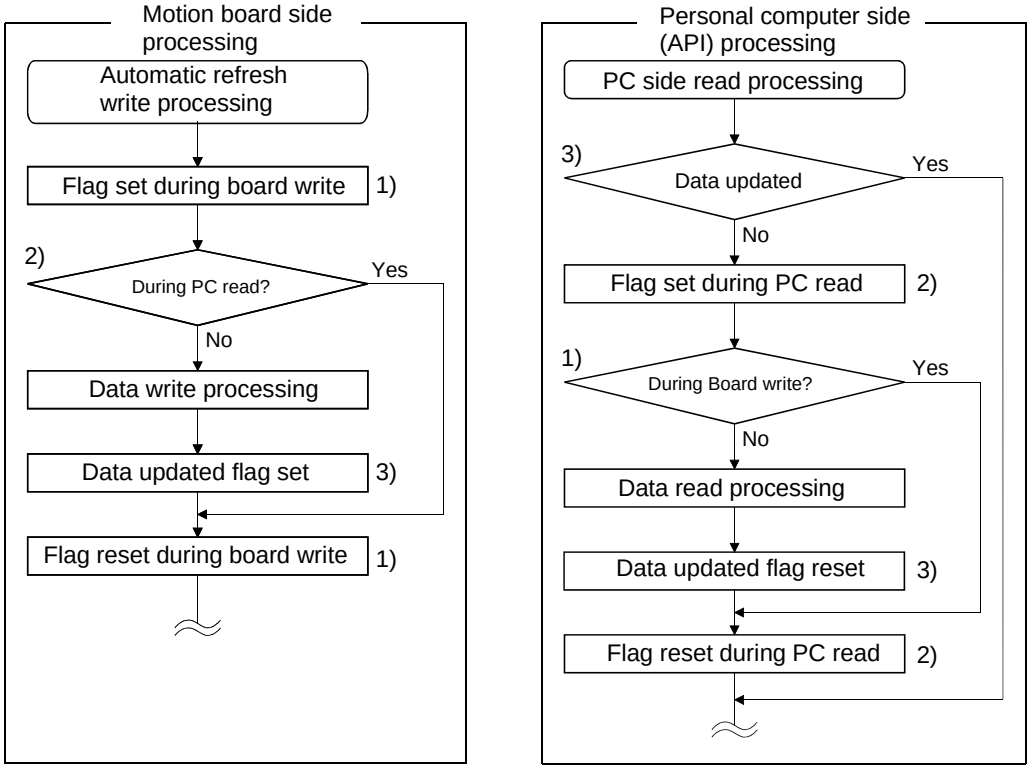
POINT

In the batch transfer function with an automatic refresh in the operation cycle or main cycle, synchronization of data is guaranteed within the specified batch transfer range.

In the automatic refresh processing, the following handshakes are made between the motion board and the communication API. This guarantees synchronization of data cycle within the specified batch transfer range.
Description of the processing is as follows.

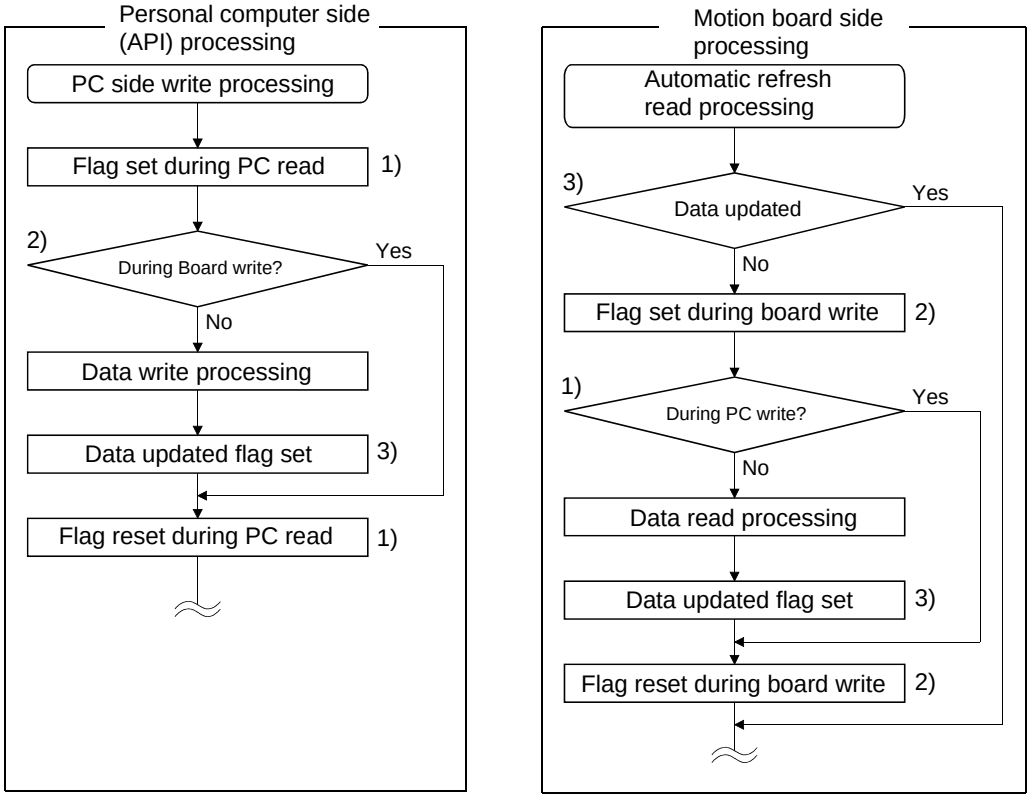
<When processing a batch transfer from Motion Board to PC>

1) The read processing from the personal computer side is not performed while the motion board is writing.
2) If the reading is in progress on the personal computer side when the motion board is writing, the writing is not processed.
3) Unless the data update processing is performed, the read processing on the personal computer side is not processed.



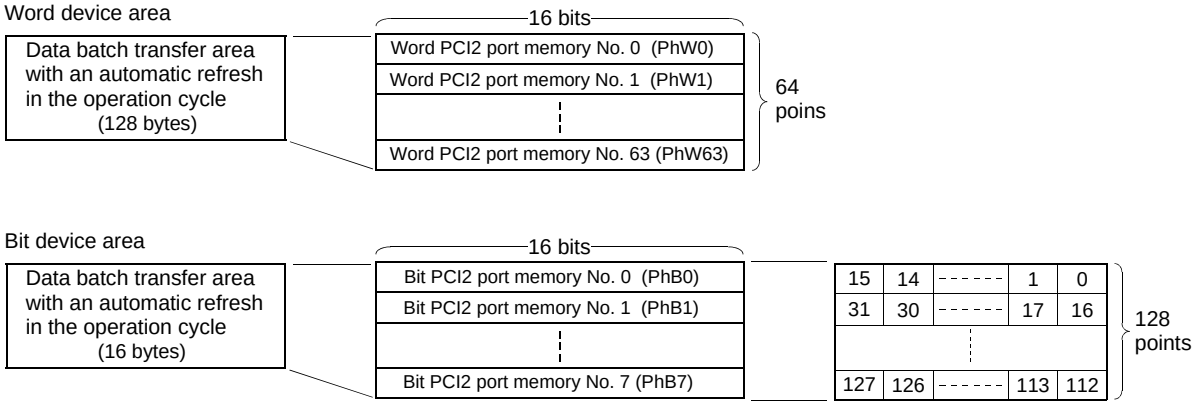
<When processing a batch transfer from the PC to Motion Board>

1) The read processing from the motion board is not performed while the writing from the personal computer is in progress.
2) If the motion board is reading when the personal computer is writing, the writing is not processed.
3) Unless the data update processing is performed, the read processing of the motion board is not performed.

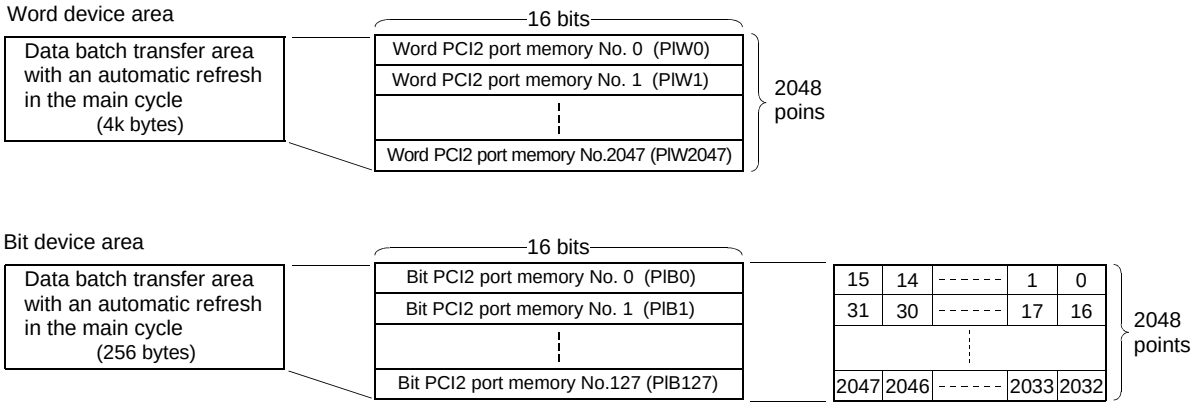


(2) Area configuration for batch transfer of automatic refresh target data

(a) Area used for automatic refresh in operation cycle


Word device area
Data batch transfer area with an automatic refresh in the operation cycle (128 bytes)
16 bits
Word PCI2 port memory No. 0 (PhW0)
Word PCI2 port memory No. 1 (PhW1)
Word PCI2 port memory No. 63 (PhW63)
64 poins
Bit device area
Data batch transfer area with an automatic refresh in the operation cycle (16 bytes)
16 bits
Bit PCI2 port memory No. 0 (PhB0)
Bit PCI2 port memory No. 1 (PhB1)
Bit PCI2 port memory No. 7 (PhB7)
15 14 - - - - - - 1 0
31 30 - - - - - - 17 16
127 126 - - - - - - 113 112
128 points

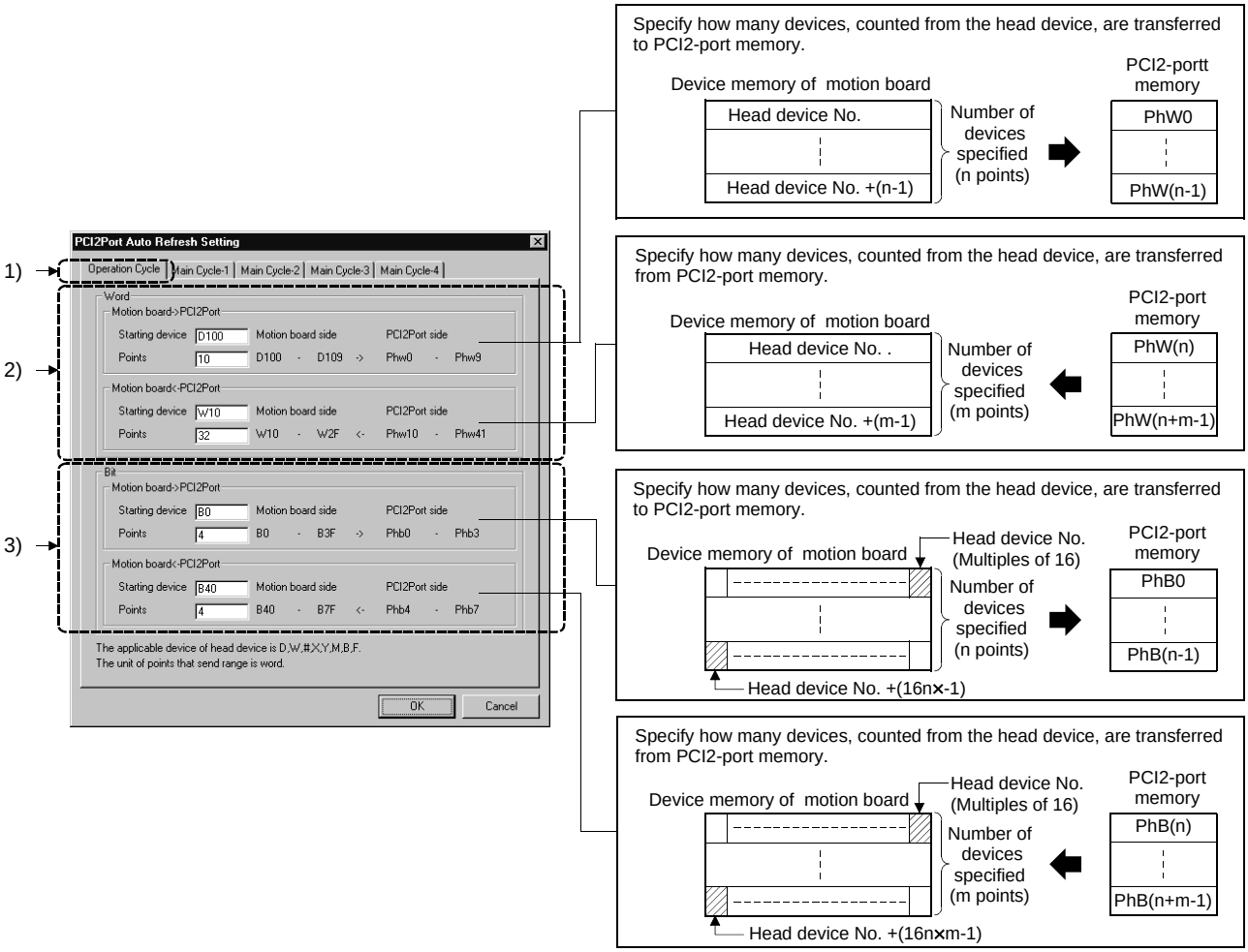
(b) Area used for automatic refresh in main cycle


Word device area
Data batch transfer area with an automatic refresh in the main cycle (4k bytes)
16 bits
Word PCI2 port memory No. 0 (PlW0)
Word PCI2 port memory No. 1 (PlW1)
Word PCI2 port memory No.2047 (PlW2047)
2048 poins
Bit device area
Data batch transfer area with an automatic refresh in the main cycle (256 bytes)
16 bits
Bit PCI2 port memory No. 0 (PlB0)
Bit PCI2 port memory No. 1 (PlB1)
Bit PCI2 port memory No.127 (PlB127)
15 14 - - - - - - 1 0
31 30 - - - - - - 17 16
2047 2046 - - - - - - 2033 2032
2048 points

(3) Automatic refresh setting

(a) Setting method for the automatic refresh in operation cycle

Make the setting of batch transfer devices (setting of the head device and the number of devices) on the setting screen for “PCI2 port automatic refresh parameter“ of the system settings.



1) Select the operation cycle by the setting switch tab.

2) Word data setting
   - Batch transfer from motion board to PCI2-port
     Set the source head device No. and transfer points.
   - Batch transfer from PCI2-port to motion board
     Set the target head device No. and transfer points.

3) Bit data setting
   - Batch transfer from motion board to PCI2-port
     Set the source head device No. and transfer points.
   - Batch transfer from PCI2-port to motion board
     Set the target head device No. and transfer points.

The PCI2 port memory for the batch transfer consecutively uses the number of specified points starting with PhW0 or PhB0.

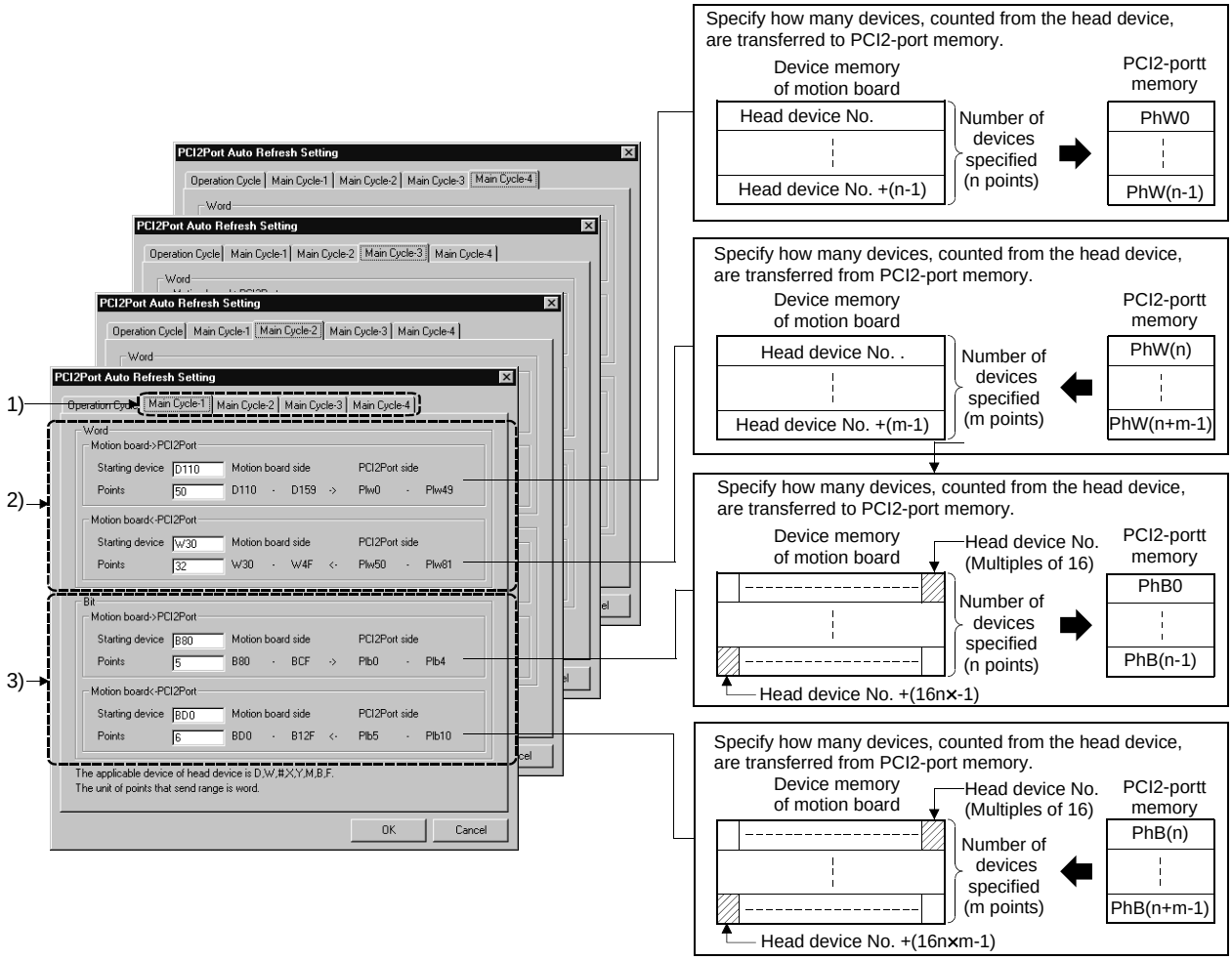
POINT

The following table shows types of devices that can be a target of automatic refresh. Note that the device transfer is performed in word (16 bits) units. When bit data is specified and the number of devices to be transferred is set to 1, 16 bit devices are transferred.
Also, when specifying the head device of bit devices, the head device is specified with multiples of 16.

	Devices type
word device	D,W,#
Bit device	M,B,F,X,Y

(b) Setting for the automatic refresh in main cycle

Make the setting of batch transfer devices (setting of the head device and the number of devices) on the setting screen for “PCI2 port automatic refresh parameter“ of the system settings.



In the automatic refresh setting window, the setting pattern can be divided into 4 different areas by switching between main cycle tabs.

1) Select Main cycle 1 to 4 using the setting switch tabs.
2) Setting for the word data in the selected area
   - Batch transfer from motion board to PCI2-port
     Set the source head device No. and transfer points.
   - Batch transfer from PCI2-port to motion board
     Set the target head device No. and transfer points.
3) Setting for the bit data in the selected area
   - Batch transfer from motion board to PCI2-port
     Set the source head device No. and transfer points.
   - Batch transfer from PCI2-port to motion board
     Set the target head device No. and transfer points.

The PCI2 port memory for the batch transfer consecutively uses the number of specified points starting with PIW0 or PIB0.

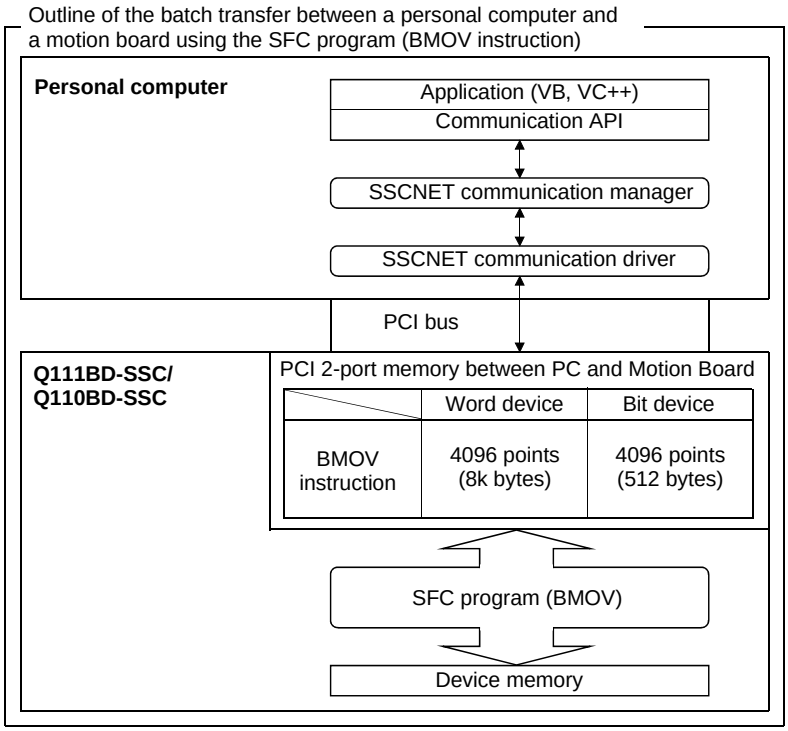
POINT

The following table shows types of devices that can be a target of automatic refresh. Note that the device transfer is performed in word (16 bits) units.
When bit data is specified and the number of devices to be transferred is set to 1, 16 bit devices are transferred.
Also, when specifying the head device of bit devices, the head device is specified with multiples of 16.

	Devices type
word device	D,W,#
Bit device	M,B,F,X,Y

8.5.2 Data batch transfer with Motion SFC program (BMOV instruction)

The block transfer instruction (BMOV) of the Motion SFC program allows data communication between the device memory of the motion board and PCI2-port memory. Data communication between a personal computer and the PCI2-port memory is performed with API that contains functions for SSCNET communication. For information on how to use the API, refer to Help of SW6RN-SNETP-E0011.)
The following shows the outline of the batch transfer function that is performed by the Motion SFC program (BMOV instruction) between a personal computer and a motion board.

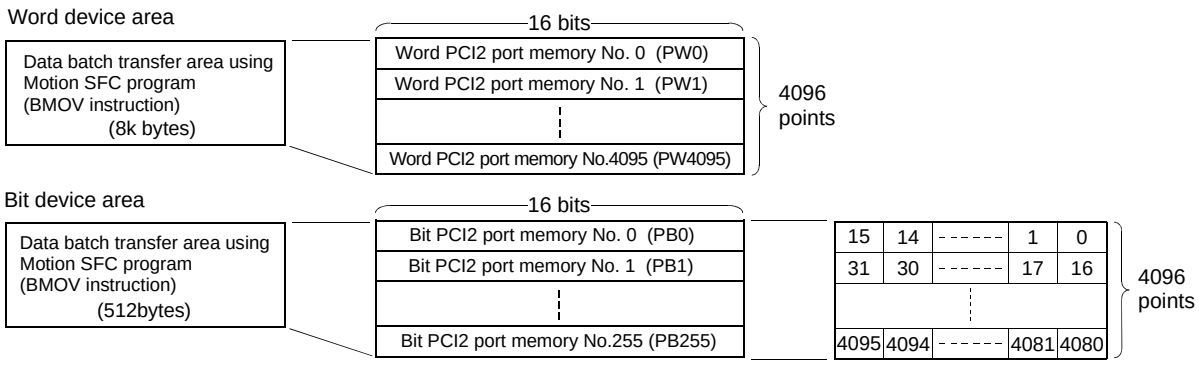


The following shows the devices that can be set by the block transfer instruction (BMOV) of the Motion SFC program.

	Device type
Word device	D,W,#
Bit device	M,B,F,X,Y

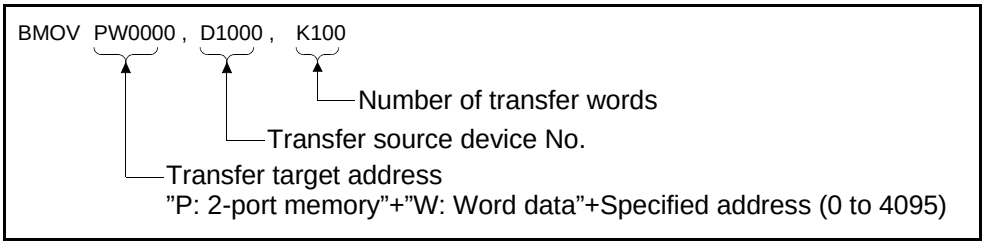
- The device No. of bit data is designated in multiples of 16.
- The special relay (M9000 to M9255) and the dedicated devices (M2000 to M2399) cannot be set.

(1) Area configuration for batch transfer of Motion SFC program block transfer instruction (BMOV) target data.

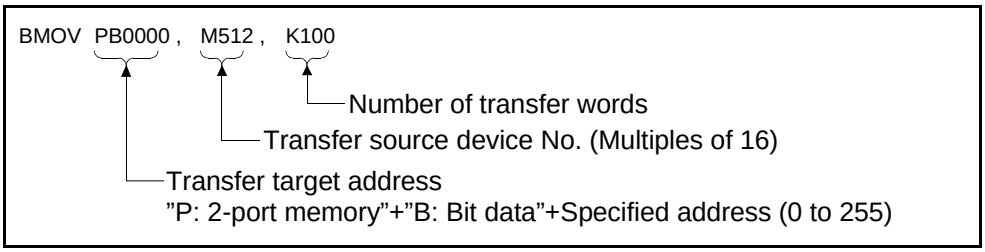

Word device area
Data batch transfer area using Motion SFC program (BMOV instruction) (8k bytes)
16 bits
Word PCI2 port memory No. 0 (PW0)
Word PCI2 port memory No. 1 (PW1)
Word PCI2 port memory No.4095 (PW4095)
4096 points
Bit device area
Data batch transfer area using Motion SFC program (BMOV instruction) (512bytes)
16 bits
Bit PCI2 port memory No. 0 (PB0)
Bit PCI2 port memory No. 1 (PB1)
Bit PCI2 port memory No.255 (PB255)
15 14 - - - - - - 1 0
31 30 - - - - - - 17 16
4095 4094 - - - - - - 4081 4080
4096 points

(2) Description of method for the block transfer instruction (BMOV) of the Motion SFC program

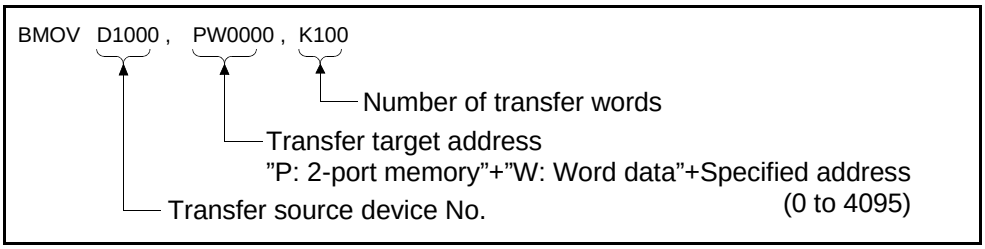
a) When transferring word device data to the word device batch transfer area of PCI2-port memory


BMOV PW0000 , D1000 , K100
Number of transfer words
Transfer source device No.
Transfer target address
"P: 2-port memory"+"W: Word data"+Specified address (0 to 4095)

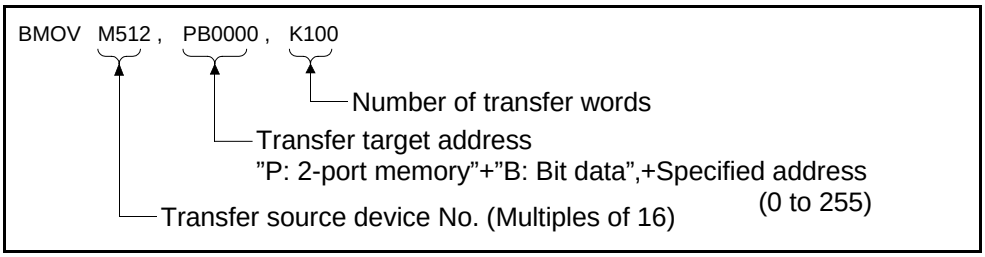
b) When transferring bit device data to the bit device batch transfer area of PCI2-port memory


BMOV PB0000 , M512 , K100
Number of transfer words
Transfer source device No. (Multiples of 16)
Transfer target address
"P: 2-port memory"+"B: Bit data"+Specified address (0 to 255)

c) When transferring data in the word device batch transfer area of PCI2-port memory to the word device.


BMOV D1000 , PW0000 , K100
Number of transfer words
Transfer target address
"P: 2-port memory"+"W: Word data"+Specified address
(0 to 4095)
Transfer source device No.

d) When transferring data in the bit device batch transfer area of PCI2-port memory to the bit device.


BMOV M512 , PB0000 , K100
Number of transfer words
Transfer target address
"P: 2-port memory"+"B: Bit data",+Specified address
(0 to 255)
Transfer source device No. (Multiples of 16)

8.5.3 Data Batch Transfer between Personal Computer and PCI2-Port Memory

The PCI memory access function, which directly accesses the 2-port memory between a personal computer and a board, allows batch transfer of data.
The following shows the list of API that is used for data batch transfer between a personal computer and PCI2-port memory.

	Function name	Description
PCI memory access	SnetPCIMemRead	Reads the PCI2-port memory between a personal computer and a motion board. (For the batch transfer area access using BMOV)
	SnetPCIMemWrite	Writes the PCI2-port memory between a personal computer and a motion board. (For the batch transfer area access using BMOV)
	SnetPCIRefresh	Refresh the PCI2 port memory between a personal computer and a motion board automatically.

For information on how to use the API, refer to Help of SW6RN-SNETP-E0011.

9 INSPECTION AND MAINTENANCE

9.1 Battery

The special relays (M9006, M9007) turn ON due to the Motion CPU program or a decrease in voltage of the memory back-up battery.
Even if these special relays turn ON, the program and the contents of memory back-up are not erased immediately.
However, if these relays are overlooked, the contents may be erased.
Replace the old battery with a new one within the specified time after M9006, M9007 turn ON .

POINT
M9007 turns ON due to the decrease in voltage of battery. Even if M9007 turns ON, it holds the data for a specified time. However, for safety, replace the battery with a new one as soon as possible.

When the external battery voltage is lowered, M9006 and M9007 turn ON.
M9006 always detects the battery decrease, and it turns OFF when the battery voltage becomes normal.
M9007 detects the battery decrease, and it holds an alarm until the power supply is turned ON again or reset even if the battery voltage becomes normal.

9.1.1 Battery service life time

The battery service life time corresponding to the type is shown below.

Type	Battery Service Life Time (Total Power Failure Time) [h] (Note)		
	Guaranteed Time (MIN)	Actual Time (TYP)	After the Battery Decrease
Battery (Q6BAT)	43800	876000	120 (After M9006, M9007 on)

(Note1): The actual time in use means the averaged time, and the guaranteed time means the minimum time.

Even if the Q6BAT is not connected to the Q111BD-SSC/Q110BD-SSC or a total power failure time does not exceed the guaranteed value, replace it with a new one in 4 to 5 years.
If a total of power failure time exceeds the guaranteed value specified above and M9006, M9007 turn on, replace the battery with a new one immediately.

9.1.2 Battery replacement procedure

When the battery has been exhausted, replace the battery with a new one in accordance with the procedure shown below.

Before removing the battery, turn ON the power supply for 10 minutes or longer. When the battery is removed, the memory is backed up by a capacitor. However, if the replacement time exceeds the guaranteed value specified in the table below, the contents stored in memory may be erased. To prevent this, replace the battery quickly.

Backup time by capacitor

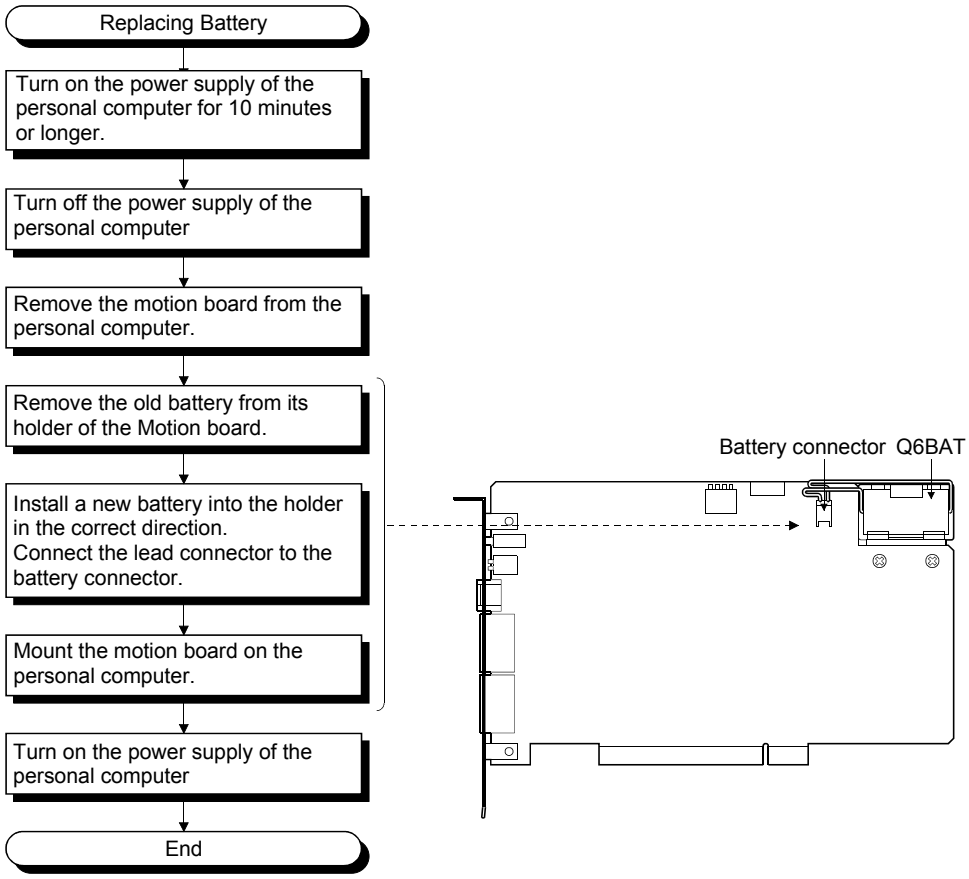
Backup time by capacitor[min]
3

POINT

Before replacing the battery, take care to do the following.

(1) Start the replacement operation after backing up the data to the personal computer which GSV[ ]P is installed on .

(2) First back up the data stored in the Motion board to the personal computer which GSV[ ]P is installed on, then replace the battery with a new one. After installation of the battery in the Battery holder unit, verify that the backed up data in the personal computer which GSV[ ]P is installed on and the data in the Motion board are the same and confirm that the data has not changed.


Replacing Battery
Turn on the power supply of the personal computer for 10 minutes or longer.
Turn off the power supply of the personal computer
Remove the motion board from the personal computer.
Remove the old battery from its holder of the Motion board.
Install a new battery into the holder in the correct direction.
Connect the lead connector to the battery connector.
Mount the motion board on the personal computer.
Turn on the power supply of the personal computer
End
Battery connector Q6BAT

9 INSPECTION AND MAINTENANCE

9.2 Troubleshooting

This section describes both the various types of trouble that occur when the system is operated, and the causes and corrective actions of these troubles.

9.2.1 Basics of troubleshooting

The basic three points that should be followed in the troubleshooting are as follows.

(1) Visual inspection
Visually check the following.
(a) Movement of machine (stopped condition, operating condition)
(b) Power supply on/off
(c) State of I/O devices
(d) Installation condition of the motion board and SSCNET III cable.
(e) State of wiring (I/O cables, cables)
(f) Display states of various types of indicators (RUN LED, ERR. LED, etc.)
(g) Setting states of various types of set switches

After confirming (a) to (g), using SW6RN-GSV□P-E0011, check the servomotor operation status, error codes, etc.

After (a) - (g) is confirmed, the state of operation and the error code of the servo motor are viewed from SW6RN-GSV*P-E0011.

(2) Check of trouble
Check to see how the operating condition varies while the Motion controller is operated as follows.
(a) Set the RUN/STOP switch of Motion Board Utility to STOP.
(b) Reset the trouble with the RESET/L.CLR switch of Motion Board Utility.
(c) Cycle the power supply of the personal computer.

(3) Reduction in area
Estimate the troubled part in accordance with items (1) and (2) above.
(a) Motion board or external devices?
(b) Servo program or Motion SFC program?

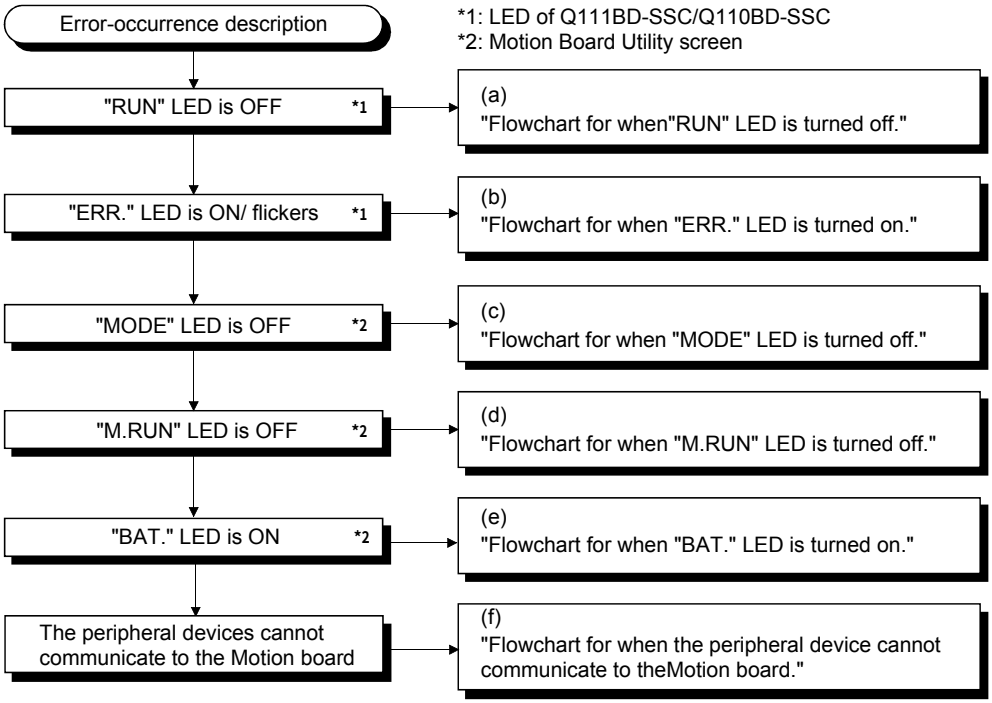
9.2.2 Troubleshooting of Motion board

This section describes the error codes meanings and corrective actions of the respective issues.

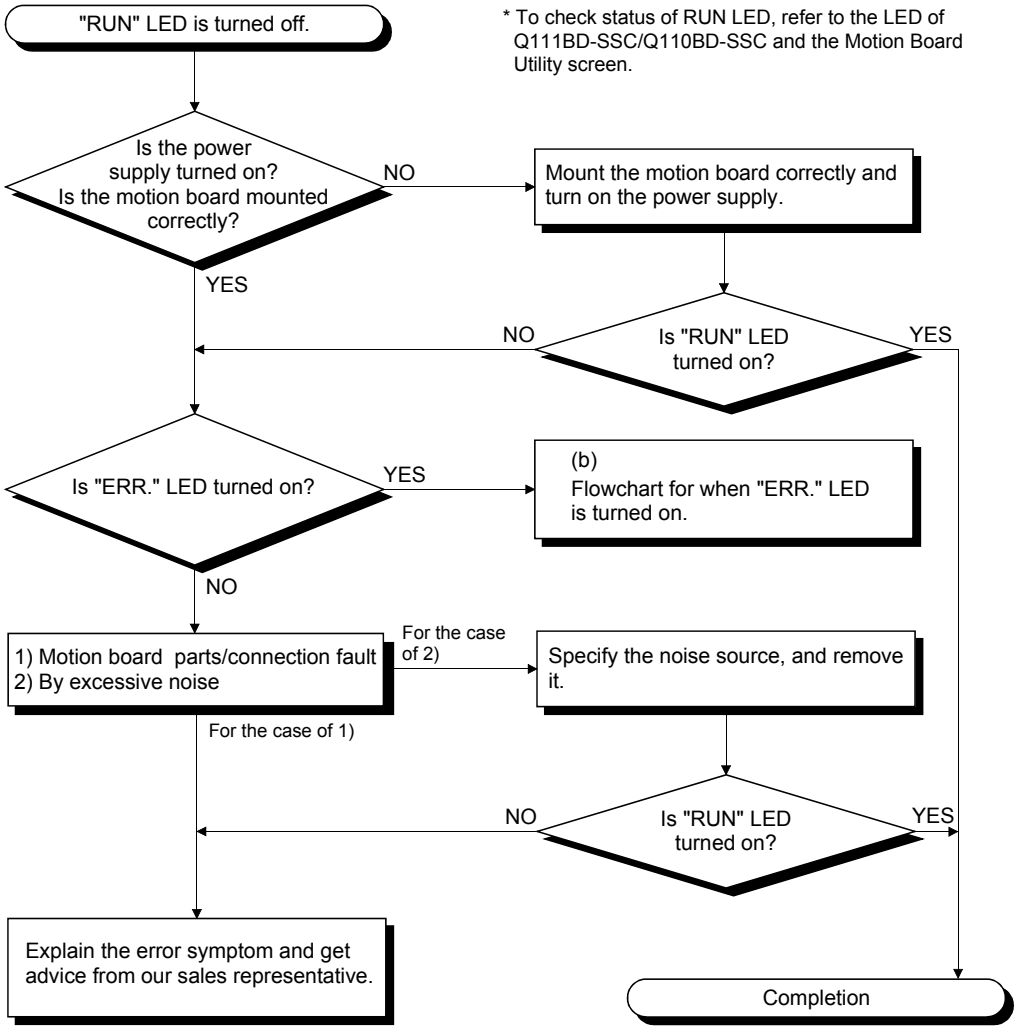
POINT
Check that the operating system software is installed at the time of Motion board module start.

(1) Troubleshooting flowchart

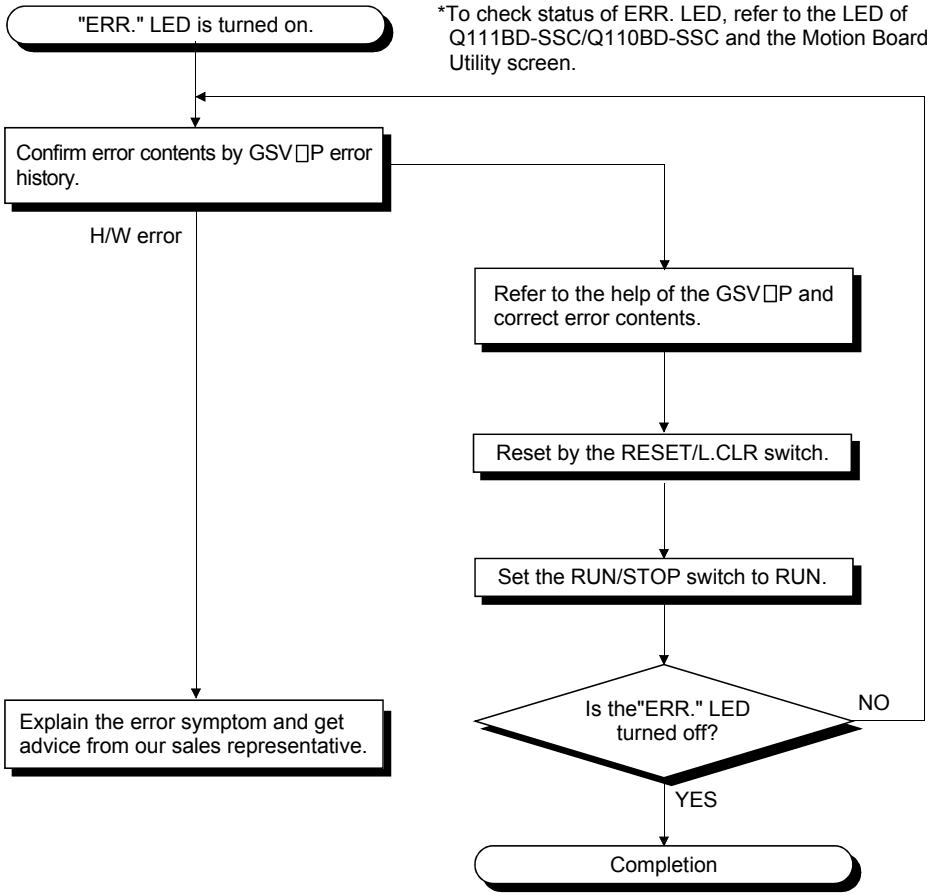
The following shows the contents of the troubles classified into a variety of groups according to the types of events.


Error-occurrence description
*1: LED of Q111BD-SSC/Q110BD-SSC
*2: Motion Board Utility screen
"RUN" LED is OFF *1
(a)
"Flowchart for when"RUN" LED is turned off."
"ERR." LED is ON/ flickers *1
(b)
"Flowchart for when "ERR." LED is turned on."
"MODE" LED is OFF *2
(c)
"Flowchart for when "MODE" LED is turned off."
"M.RUN" LED is OFF *2
(d)
"Flowchart for when "M.RUN" LED is turned off."
"BAT." LED is ON *2
(e)
"Flowchart for when "BAT." LED is turned on."
The peripheral devices cannot communicate to the Motion board
(f)
"Flowchart for when the peripheral device cannot communicate to theMotion board."

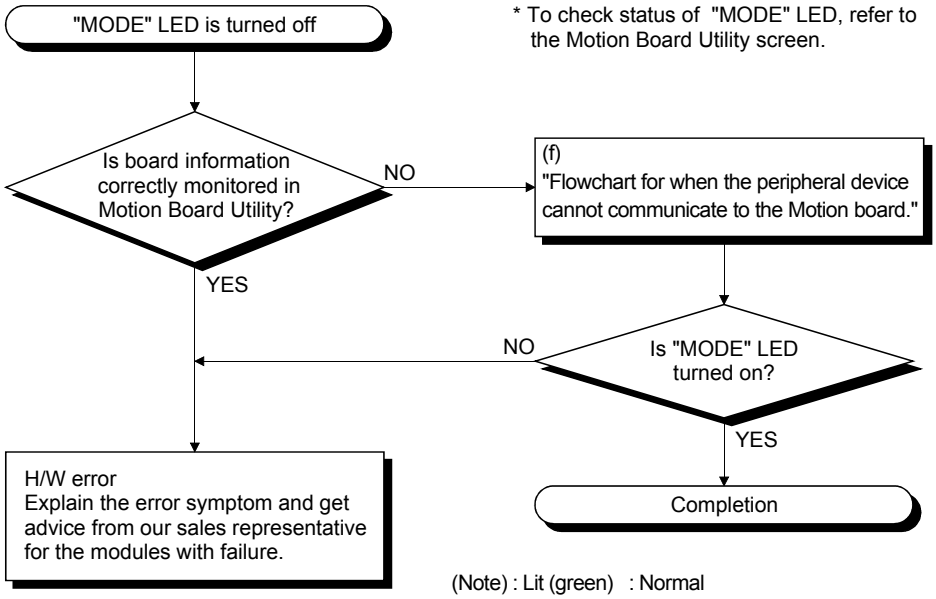
(a) Flowchart for when "RUN" LED is turned off.
The following shows a flowchart for when the "RUN" LED is turned off during operation.


"RUN" LED is turned off.
* To check status of RUN LED, refer to the LED of Q111BD-SSC/Q110BD-SSC and the Motion Board Utility screen.
Is the power supply turned on? Is the motion board mounted correctly?
NO
Mount the motion board correctly and turn on the power supply.
YES
NO
Is "RUN" LED turned on?
YES
Is "ERR." LED turned on?
YES
(b) Flowchart for when "ERR." LED is turned on.
NO
1) Motion board parts/connection fault
2) By excessive noise
For the case of 2)
Specify the noise source, and remove it.
For the case of 1)
NO
Is "RUN" LED turned on?
YES
Explain the error symptom and get advice from our sales representative.
Completion

(b) Flowchart for when "ERR." LED is turned on/flickering.
The following shows the flowchart to be followed when the "ERR." LED is turns on while the power supply is ON or during an operation start or during operation.

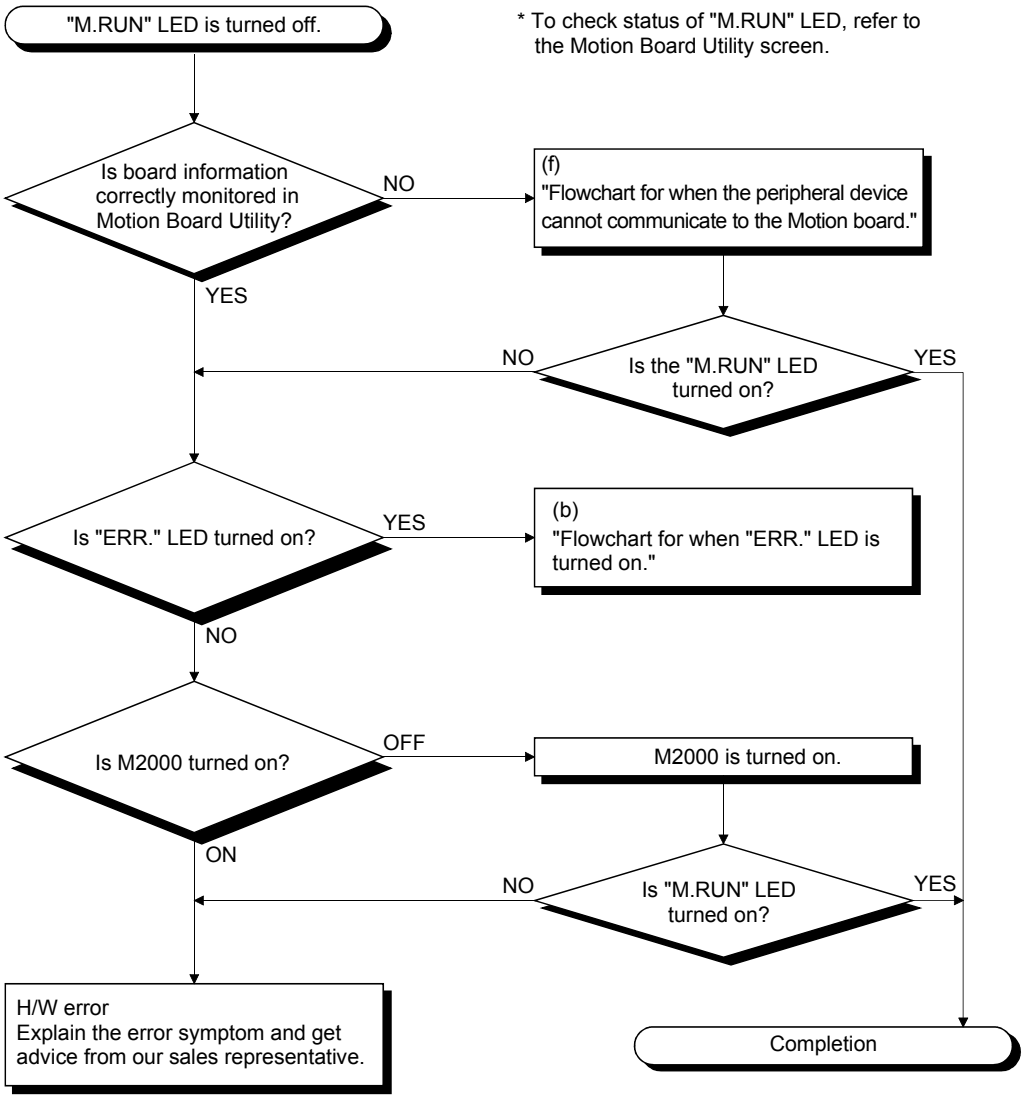

"ERR." LED is turned on.
*To check status of ERR. LED, refer to the LED of Q111BD-SSC/Q110BD-SSC and the Motion Board Utility screen.
Confirm error contents by GSV□P error history.
H/W error
Refer to the help of the GSV□P and correct error contents.
Reset by the RESET/L.CLR switch.
Set the RUN/STOP switch to RUN.
Is the"ERR." LED turned off?
NO
YES
Explain the error symptom and get advice from our sales representative.
Completion

(c) Flowchart for when "MODE" LED is turned off.
The following shows a flowchart for when the "MODE" LED is turned off when the power supply is ON.


"MODE" LED is turned off
* To check status of "MODE" LED, refer to the Motion Board Utility screen.
Is board information correctly monitored in Motion Board Utility?
NO
(f)
"Flowchart for when the peripheral device cannot communicate to the Motion board."
YES
NO
Is "MODE" LED turned on?
YES
H/W error
Explain the error symptom and get advice from our sales representative for the modules with failure.
Completion

(Note) : Lit (green) : Normal
Lit (orange) : Installation mode mode written in ROM

(d) Flowchart for when "M.RUN" LED is turned off.
The following shows a flowchart for when the "M.RUN" LED is turned off during operation.



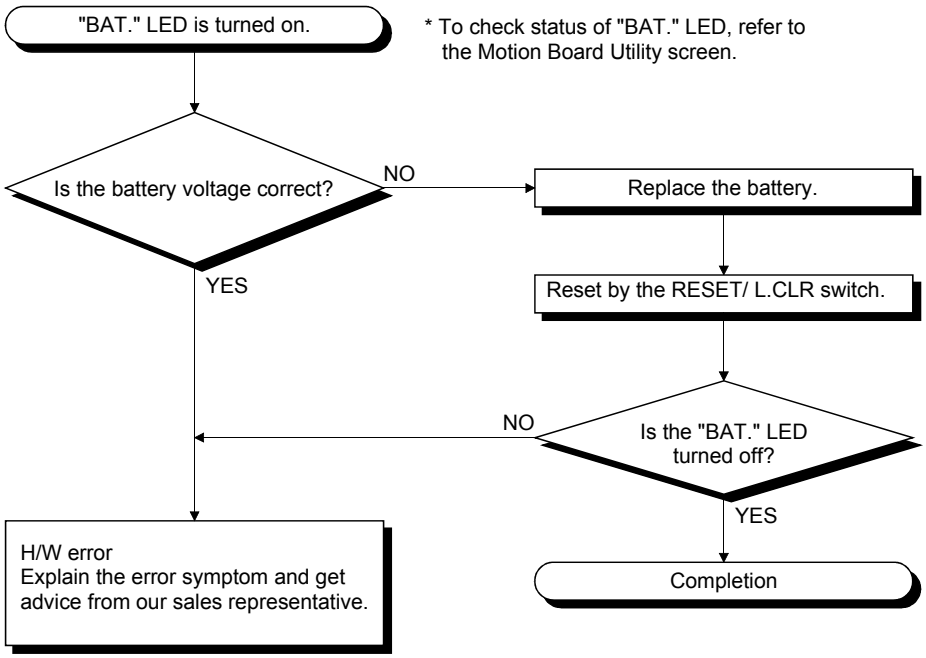
REMARK

(Note-1) : When the RUN/STOP switch is in the stop position and the L.CLR is turned ON for two seconds or more for the latch clear operation, the "M.RUN" LED flashes to indicate that the latch clear processing is under operation.
When the RESET/L.CLR switch is tilted towards L.CLR while the "M.RUN" LED flickers, the "M.RUN" LED turns off and terminates the latch clear processing.

(e) Flowchart for when "BAT." LED is turned on.

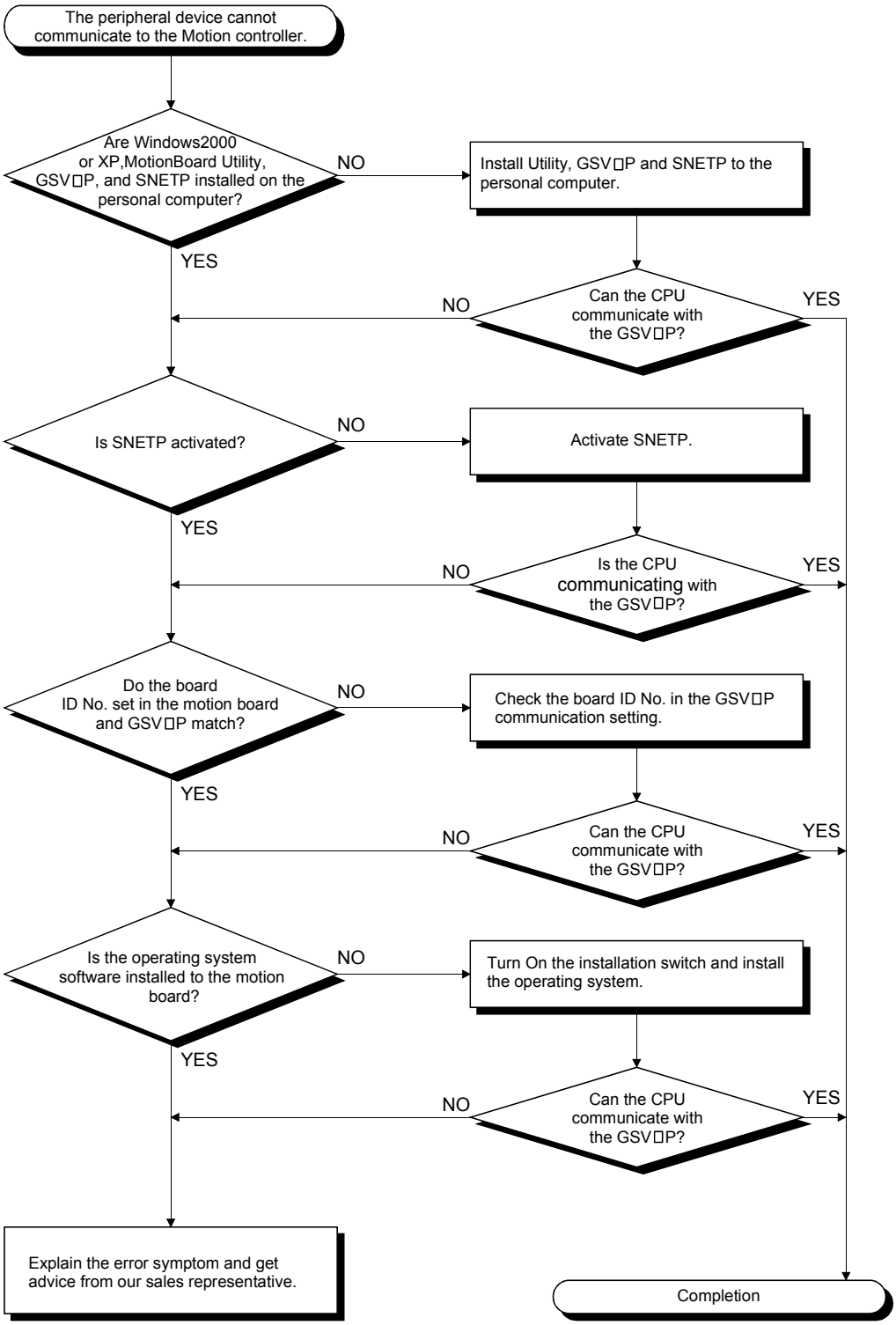
In the Motion board, when the battery capacity decreases , this LED turns on.

After replacing the battery with a new one, "BAT." LED can be turned off by executing a reset via the RESET/L.CLR switch.


"BAT." LED is turned on.
* To check status of "BAT." LED, refer to the Motion Board Utility screen.
Is the battery voltage correct?
NO
Replace the battery.
YES
Reset by the RESET/ L.CLR switch.
NO
Is the "BAT." LED turned off?
YES
H/W error
Explain the error symptom and get advice from our sales representative.
Completion

(f) Flowchart for when the peripheral device cannot communicate to the Motion board

The following shows a flowchart for when the Motion board cannot communicate with the GSV[ ]P while the power supply is ON.


The peripheral device cannot communicate to the Motion controller.
Are Windows2000 or XP,MotionBoard Utility, GSV□P, and SNETP installed on the personal computer?
NO
Install Utility, GSV□P and SNETP to the personal computer.
YES
Can the CPU communicate with the GSV□P?
NO
YES
Is SNETP activated?
NO
Activate SNETP.
YES
Is the CPU communicating with the GSV□P?
NO
YES
Do the board ID No. set in the motion board and GSV□P match?
NO
Check the board ID No. in the GSV□P communication setting.
YES
Can the CPU communicate with the GSV□P?
NO
YES
Is the operating system software installed to the motion board?
NO
Turn On the installation switch and install the operating system.
YES
Can the CPU communicate with the GSV□P?
NO
YES
Explain the error symptom and get advice from our sales representative.
Completion

9.3 Confirm method of Error Code

When an error occurs, the error code and error message can be read by the personal computer(IBM PC/AT) installation of the SW6RN-GSV[ ]P-E0011.
The procedure for reading error codes by the SW6RN-GSV[ ]P is as follows.

(1) Start SW6RN-GSV[ ]P-E0011.
(2) Select [Create a new project] - [Motion CPU Read] Menu in SW6RN-GSV[ ]P-E0011, and also read the project data from the Motion board.
(3) Select the [Monitor] - [PV Enlarged Monitor] Menu.
(4) Confirm the error code and error message that is displayed on the screen.

For details of the SW6RN-GSV[ ]P-E0011 operating method, refer to the help manual of each programming software package.

MEMO

APPENDICES

APPENDIX 1 Cables

APPENDIX 1.1 SSCNET cables

Generally, it is recommended to use the SSCNET III cables available directly from us.

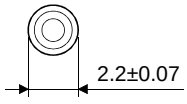
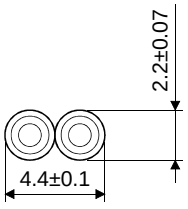
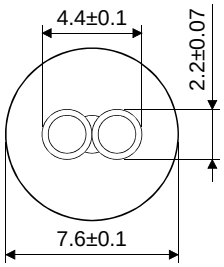
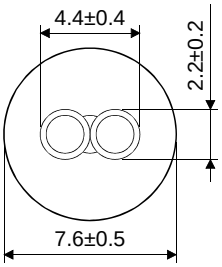
(1) Model explanation

The number in each cell below the row containing cable lengths is the value to put in the "[ ]" section of the corresponding cable model. Only those lengths which exist are available in the table.

Cable Model	Cable Length [m(ft.)]											Flex Life	Application/ remark
	0.15 (0.49)	0.3 (0.98)	0.5 (1.64)	1 (3.28)	3 (9.84)	5 (16.40)	10 (32.81)	20 (65.62)	30 (98.43)	40 (131.23)	50 (164.04)		
MR-J3BUS[ ]M	015	03	05	1	3							Standard	Standard code for inside panel
MR-J3BUS[ ]M-A						5	10	20				Standard	Standard cable for outside panel
MR-J3BUS[ ]M-B (Note-1)									30	40	50	Long flex	Long distance cable

(Note-1) : For cables of less than 30[m](98.43[ft.]), contact your nearest Mitsubishi sales representative.

(2) Specifications

		Description			
SSCNET III cable model		MR-J3BUS[ ]M		MR-J3BUS[ ]M-A	MR-J3BUS[ ]M-B
SSCNET III cable length [m(ft.)]		0.15 (0.49)	0.3 to 3 (0.98 to 9.84)	5 to 20 (16.40 to 65.62)	30 to 50 (98.43 to 164.04)
Optical cable (Cord)	Minimum bend radius [mm(inch)]	25 (0.98)		Reinforcing coat cable: 50 (1.97) Code: 25 (0.98)	Reinforcing coat cable: 50 (1.97) Code: 30(1.18)
	Tension strength [N]	70	140	420 (Enforced covering cord)	980 (Enforced covering cord)
	Temperature range for use [°C(°F)] (Note-1)	-40 to 80 (-40 to 176)			-20 to 70 (-4 to 158)
	Ambient	Indoors (no direct sunlight), No solvent or oil			
	External appearance [mm]				

(Note-1): This temperature range for use is the value for optical cable (cord) only.

POINT

(1) If the end face of the optical cord tip for the SSCNET III cable is dirty, optical transmission will be interrupted and this may cause malfunctions. If it becomes dirty, wipe with a bonded textile, etc. Do not use solvents such as alcohol.
(2) Do not exert excessive force on the SSCNET III cable connector.
(3) When incinerating the SSCNET III cable (optical fiber), hydrogen fluoride gas or hydrogen chloride gas which is corrosive and harmful may be generated. For disposal of the SSCNET III cable (optical fiber), request for specialized industrial waste disposal service who has an incineration facility for disposing hydrogen fluoride gas or hydrogen chloride gas.

(a) MR-J3BUS[ ]M
1) Model explanation

Type: MR-J3BUS[ ]M-*

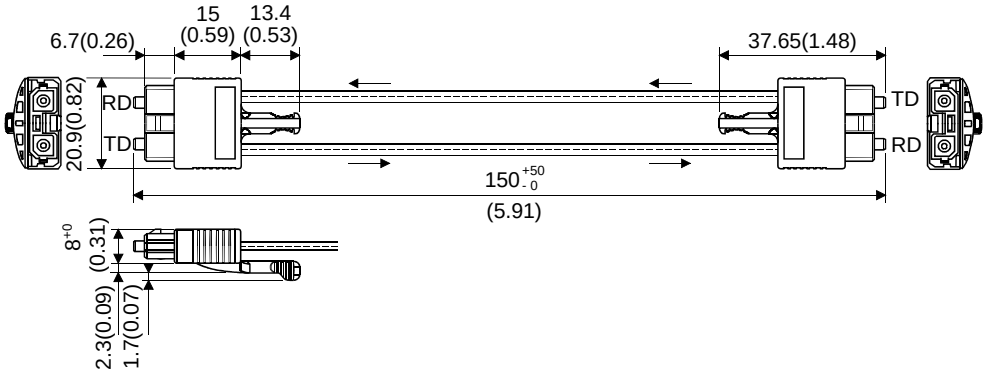
Symbol	Cable Type
None	Standard cable for inside panel
A	Standard cable for outside panel
B	Long distance cable

Symbol	Cable Length [m(ft.)]
015	0.15 (0.49)
03	0.3 (0.98)
05	0.5 (1.64)
1	1 (3.28)
3	3 (9.84)
5	5 (16.40)
10	10 (32.81)
20	20 (65.62)
30	30 (98.43)
40	40 (131.23)
50	50 (164.04)

2) Exterior dimensions

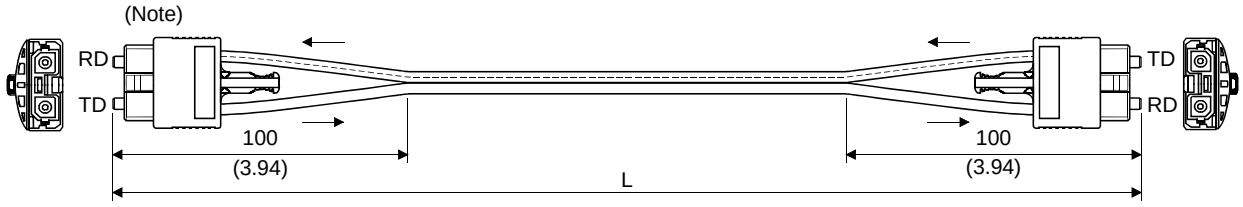
- MR-J3BUS015M

[Unit: mm(inch)]



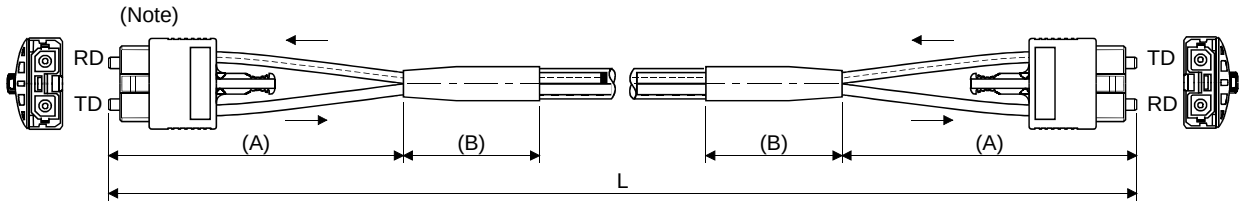
- MR-J3BUS03M to MR-J3BUS3M
  Refer to the table in section (1) of this appendix for cable length (L).

[Unit: mm(inch)]



- MR-J3BUS5M-A to MR-J3BUS20M-A,MR-J3BUS30M-B to MR-J3BUS50M-B
  Refer to the table in section (1) of this appendix for cable length (L).

SSCNET Cable	Variation [mm(inch)]	
	A	B
MR-J3BUS5M-A to MR-J3BUS20M-A	100(3.94)	30(1.18)
MR-J3BUS30M-B to MR-J3BUS50M-B	150(5.91)	50(1.97)



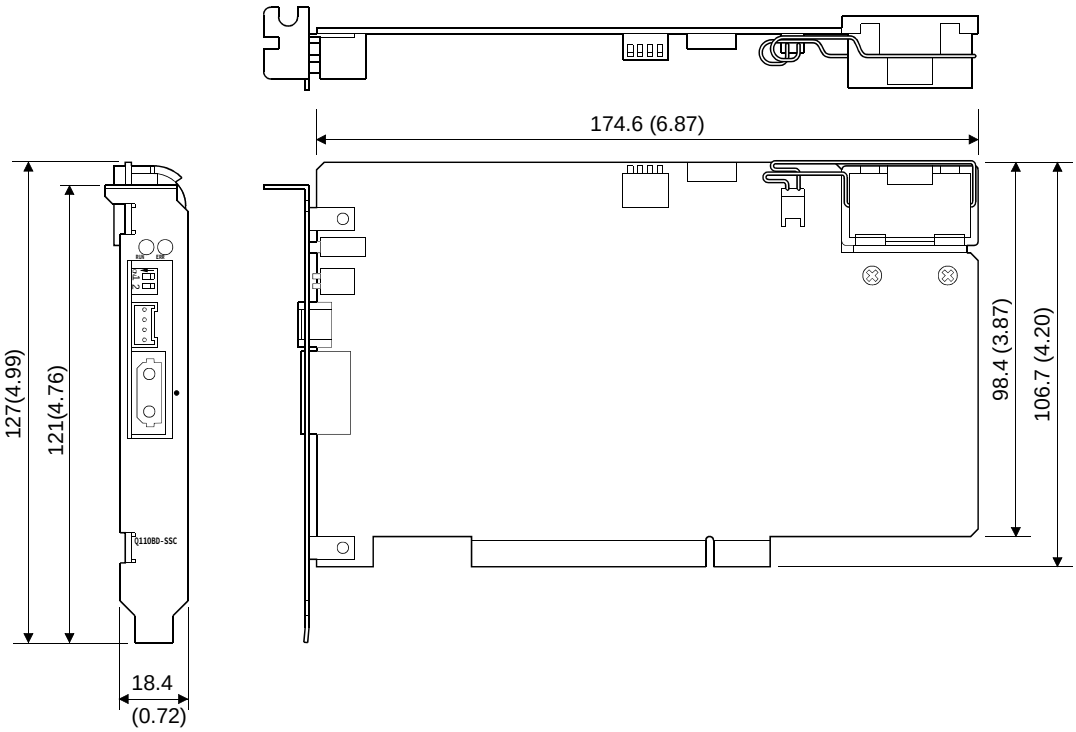
(Note) : Dimension of connector part is the same as that of MR-J3BUS015M.

APPENDIX 2 Exterior Dimensions

APPENDIX 2.1 Motion board

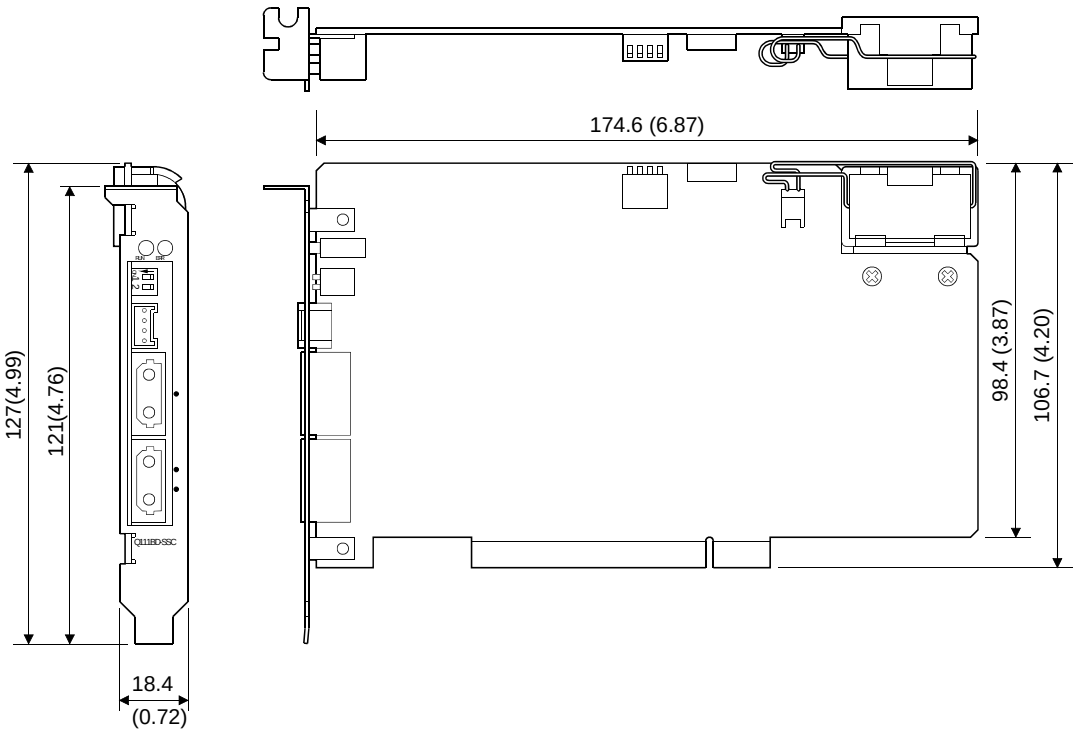
(1) Q110BD-SSC

[Unit: mm (inch)]



(2) Q111BD-SSC

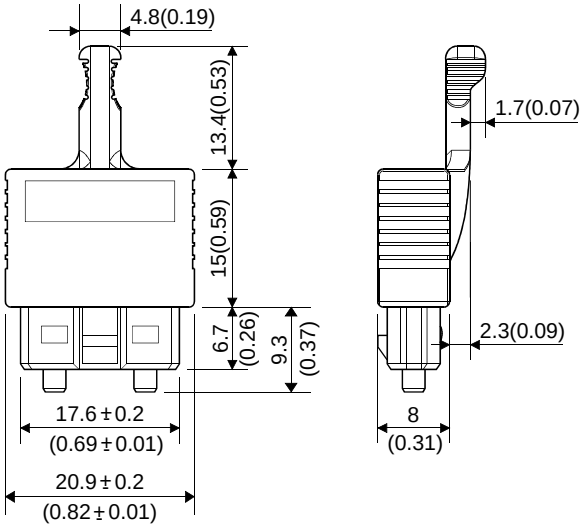
[Unit: mm (inch)]



APPENDIX 2.2 Connector

(1) SSCNET III cable connector

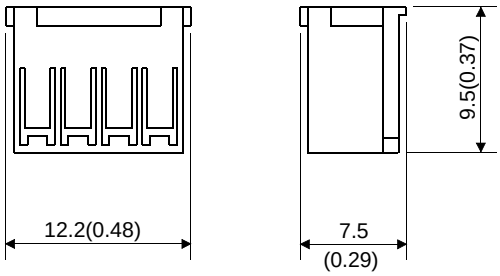
[Unit: mm (inch)]



(2) Molex Japan Co., Ltd. (External input / output signal connector)

[Unit: mm (inch)]

Type Connector : DF3-2S-2C
Terminal : DF3-2428SCC



WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

Note that an installation period of less than one year after installation in your company or your customer's premises or a period of less than 18 months (counted from the date of production) after shipment from our company, whichever is shorter, is selected.

[Gratis Warranty Range]

(1) Diagnosis of failure
As a general rule, diagnosis of failure is done on site by the customer.
However, Mitsubishi or Mitsubishi service network can perform this service for an agreed upon fee upon the customer's request.
There will be no charges if the cause of the breakdown is found to be the fault of Mitsubishi.

(2) Breakdown repairs
There will be a charge for breakdown repairs, exchange replacements and on site visits for the following four conditions, otherwise there will be a charge.
1) Breakdowns due to improper storage, handling, careless accident, software or hardware design by the customer
2) Breakdowns due to modifications of the product without the consent of the manufacturer
3) Breakdowns resulting from using the product outside the specified specifications of the product
4) Breakdowns that are outside the terms of warranty

Since the above services are limited to Japan, diagnosis of failures, etc. are not performed abroad.
If you desire the after service abroad, please register with Mitsubishi. For details, consult us in advance.

2. Exclusion of Loss in Opportunity and Secondary Loss from Warranty Liability

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

3. Onerous Repair Term after Discontinuation of Production

Mitsubishi shall accept onerous product repairs for seven years after production of the product is discontinued.

4. Delivery Term

In regard to the standard product, Mitsubishi shall deliver the standard product without application settings or adjustments to the customer and Mitsubishi is not liable for on site adjustment or test run of the product.

5. Precautions for Choosing the Products

(1) These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
(2) Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or under water relays, contact Mitsubishi.
(3) These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.
(4) When exporting any of the products or related technologies described in this catalogue, you must obtain an export license if it is subject to Japanese Export Control Law.

MOTION CONTROLLER Qseries

（Q111BD-SSC/Q110BD-SSC） User's Manual

MITSUBISHI ELECTRIC CORPRATION

HEAD OFFICE : 1-8-12, OFFICE TOWER Z 14F HARUMI CHUO-KU 104-6212,JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

MODEL	Q111BD-U-E
MODEL CODE	
IB(NA)-0300122-A(0701)MEE	

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.